

## Prevalence on *Ascaridia galli* and *Heterakis gallinarum* of Local and Exotic Chickens at Debrezeit Agricultural Research Poultry Farm

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**Abstract:** Parasites are one of devastating diseases in poultry farms. This subsequently leads to economic crises. A study was conducted to determine the prevalence of *Ascaridia galli* and *Heterakis gallinarum* in 202 local and exotic chickens raised under intensive management system originated from Debrezeit Agricultural Research Center poultry farm from November 2008 to April 2009. The parasitological diagnosis procedures were conducted to detect the parasites. The study indicated that 42(20.79%) and 15(7.42%) of the examined chickens were harboring *Ascaridia galli* and *Heterakis gallinarum* respectively. There was no statistically significant difference ( $P>0.05$ ) in the prevalence of *Ascaridia galli* between breed and age groups of chickens. However, there was statistically significant difference ( $P<0.05$ ) in the prevalence of between two sexes of chicken. The present study shown that local and exotic chicken was kept under intensive management system in Debrezeit Agricultural Research Center poultry farm were exposed to infection with *Ascaridia galli* and *Heterakis gallinarum*. This is alarming condition for the farm. To prevent and minimize these parasites in farm level, hygienic measurements are strictly practiced to keep farm and consumer safety.

**Key words:** DZARC • Poultry • *Ascaridia galli* • *Heterakis gallinarum* • Prevalence

### INTRODUCTION

The term "poultry" covers a wide variety of birds including chickens, Turkeys, ducks and guinea fowls. Of these types of poultry, chickens are more widely distributed than any class of livestock. Chickens are widely spread at almost every family, in Ethiopia, providing valuable source of protein and cash income. About 99 % of Ethiopian poultry resources managed under backyard production system undergo poor handling scheme. Backyard production system involves low productivity with less input and periodic flock devastation due to the different reasons [1].

The poultry production is very important in supply of high quality protein (egg and meat) in human diet and cash income [2]. Reports of CSA [1] indicate that the population of poultry in Ethiopia is estimated to be 42 million. Excluding the pastoral and agro pastoral areas of these only 1% is raised under intensive management system and while the remaining 99% are raised under backyard or traditional low input production system [3].

Indigenous chickens in Ethiopia are predominantly raised were traditional family based free range scavenging management system is practiced CSA [1], Tadele [2] and Alamargot [4]. On the other hand, the current trends indicate the improved breeds kept under intensive management systems are increasing in number. This is mainly because of small scale poultry farm especially in and around Addis Ababa, Debrezeit [4].

Parasites are among the infectious agents that cause an alarming problem to the industry, posing adverse economic effects. Gastrointestinal parasitism leads to significant economic losses in poultry [5].

The success of poultry farming is largely dependent on improved management, proper nutrition, effective disease prevention and control schemes [6].

Poultry diseases are the most important constraint responsible for reducing in both the number and productivity of chickens Alamargot [3], Aklilu [5] and Nasser [6]. Different poultry diseases have been recorded in exotic and local chickens in Ethiopia. Among these disease parasitic diseases like *H. gallinarum* and *A. galli*

are economically important and prevalent diseases particularly in chickens of Ethiopia [7]. *A. galli* is one of most common intestinal nematode of domestic chicken. Infestation with *A. galli* is responsible for retarded growth, diarrhea, emaciation, reduction in egg production, petechial hemorrhage of mucus membrane of the gut, inflammation, obstruction of intestine even occlusion and death in severely affected animals [8]. *A. galli* is by far the largest nematode of poultry and is more important in young animals [9].

On the other hand, *H. gallinarum* is small, white round worms and lives in the caecum. The direct effect of this worm is slight but in heavy infection there is thickening of caecal mucosa with petechial haemorrhage [10]. *H. gallinarum* has little economic importance as parasites of domestic chicken. However, it becomes a serious economic problem when it serves as a carrier for the protozoal disease called histomoniasis or black head disease, which is caused by *Histomonas meleagridis*. The protozoa survive in the egg of *H. gallinarum* for long period Tadelde [2], Alamargot [4], Nasser [6], Permin *et al.* [7], Poulsen *et al.* [8], Ssenyong [9], Tanse and Pandey [11]. The organism is transmitted among chicken with the eggs of *Heterakis* and with earth worm containing hatched larvae of the worm.

Generally, small number of infestation of these parasites does little damage to the host chicken but a large numbers of worms cause unthriftiness and result in the general impairment of growth, egg production and feed conversion. The damage caused by these worms is more marked in young than adult chicken [12].

Nowadays, poultry production is now very important and wide spread agricultural industry in tropical countries. This is aimed to not only supply high quality protein from meat and egg to human diet but also it serves as source of cash income [13]. Parasites are extremely common in tropical and subtropical areas where the standard of husbandry and sanitation are poor and the climatic conditions are highly conducive for the development and survival of parasites CSA [1], Permin *et al.* [7], Poulsen *et al.* [8], Ssenyong [9] and Abebe W [14]. No available study was conducted as a result; there is lack of information on these parasites in the current study.

Thus, the objectives of the present study were;

- To determine the prevalence of *Ascaridia galli* and *Heterakis gallinarum* of local and exotic chickens in DZARC poultry farm
- To assess the risk factors associated with infection of parasites

## MATERIALS AND METHODS

**Study Area and Periods:** Debrezeit is located East Shewa Zone of the Oromia region, 47.9 km south-east of Addis Ababa at latitude and longitude of 10° 35' 0" N and 35° 48' 0" E respectively. The area lies at an altitude of 1850 meter above sea level and experiences the mean annual rainfall, maximum and monthly temperatures ranges between 801.3mm 25.5, 23°C.7 in July & 27.7 °C May, respectively with an elevation of 1850 meter above sea level. The area experiences the mean annual rainfall, maximum and monthly temperatures range between 801.3mm, 25.5, 23°C in July & 27.7 °C in May, respectively. The mean annual minimum temperature is 10.5°C monthly values ranges between 7.4 in December and 12.1°C in July and August [14].

**Study Animals:** A total of 202 animals (local and cross breed) were during the study period. Systemic random sampling selected for infected and suspected cases, irrespective of their age, breed, sex and agro-ecological set. The samples then transported to the Addis Ababa University, School of Veterinary Medicine in ice box within 3–4 hours.

**Study Design:** A cross-sectional study was conducted to determine prevalence rates of parasites from Nov, 2008 to April, 2009 in Debrezeit.

**Sample Collection Procedures:** A total of 202 clinically sick and dead local and exotic chickens of young (n=112) and adult (n=90) kept under intensive management system were considered for the study purpose. All age group, sex and breed types were included in the study. A total of 101 of local and 101 exotic chickens were examined during the study period. Of the studied local chickens 45 are males and 56 are females whereas, 48 males and 53 females of exotic chickens were sampled and these were selected randomly and then transported to the parasitology laboratory of Faculty of Veterinary Medicine (FVM) Debrezeit for detailed parasitological and necropsy examinations.

### Isolation and Identification of Parasite

**Euthanasia:** Birds were killed humanely by dislocation of their neck. This was achieved by holding the chicken by its feet and pulling down wards on the neck and bending the neck sharply backwards as describes in Smith [15]. The viscera was separated from mesentery were detached in to four pieces. The esophagus and crop in one piece, gizzard with proventricles, caeca and the rest of the

intestine and were kept in separate containers. The identified caeca and intestine are incised longitudinally. All worms were collected and placed in separate beakers containing physiological saline. The parasites were examined under stereo microscope first and later all put on microscopic slide and covered the cover slip and examined under 10x of compound microscope after adding a drop of lacto phenol [10].

**Identification and Description of Parasites:** Examined worms were identified according to the standard morphological identification keys given by Tanse and Pandey [10], Gordon [16], Calnek *et al.* [17]. *A. galli* is the largest nematode occurs in the small intestine of chicken, fowl guinea fowl, turkeys, ducks, goose and various wild birds. It is thick, yellowish hand white worms. They possess three large lips and oesophagus has no posterior bulb and the tail of the male has small alae and bears ten pairs of papillae most of which are short and thick and the precloacal sucker with a thick cuticular rim and spicules are equal and vulva found anterior part of the body [11, 16].

*H. gallinarum* is whitish worm occurs in the caecum of chicken, fowl, guinea fowl, turkey, ducks, goose and other birds. It possess large lateral alae extending some distance down the sides of the body and the esophagus has strong posterior bulb, the tail of the male is provided

with large alae, prominent circular, precloacal sucker and has 12 pairs of papillae. Spicules are unequal, the right is slender and long where as the left have broad alae and the vulva opens directly behind the middle of the body [17].

**Data Analysis:** All the collected data were birds based on breed, sex and age and stored in Microsoft Excel Spread Sheet. Data analysis was carried out by using computer based SPSS 15 statistical packaged. P-value <0.05 was considered to be indicative of a statistical significant difference.

## RESULTS

Overall prevalence of 34.65% were recorded (Table 1), whereas, the respective prevalence of 25.74% and 8.91% was recorded *A. galli* and *H. gallinarum* in local chickens (Table 1).

The difference in the prevalence of *A. galli* was not statistically significant difference ( $P > 0.05$ ) based on breed 25.74% and age 32.14% in young and 6.66% in adult. Whereas, there was statistically significant difference ( $P < 0.05$ ) in sex: In *H. gallinarum*, there was statistically significant difference ( $P < 0.05$ ) in breed 8.91%. However, there was no statistically significant difference ( $P > 0.05$ ) between age: young 3.57% and adult 8.88% as well as sex: male 6.66% and female 10.71% (Table 2).

Table 1: Prevalence of *A. galli* and *H. gallinarum* of local chickens in Debrezeit Agricultural Research Center poultry farm

Parasites	No examined	No infected	Prevalence (%)
<i>A. galli</i>	101	21	26 (25.74)
<i>H. gallinarum</i>	101	6	9(8.91)
Total	202	27	35 (34.65)

Table 2: Overall prevalence of *A. galli* and *H. gallinarum* of local chickens in Debrezeit Agricultural Research Center (DZARC) poultry farm based on sex and age

Parasites	No examined	No infected	Prevalence		Prevalence	
			M	F	Young	Adult
<i>A. galli</i>	101	21	16 (35.55%)	5 (8.65%)	18 (32.14%)	3 (6.66%)
<i>H. gallinarum</i>	101	6	3 (6.66%)	6 (10.71%)	2 (3.57%)	4 (8.88%)
Total	202	27	19 (42.21%)	8 (16.86)	20 (35.71%)	7 (15.54%)

M= male; F= female;

Table 3: Prevalence of *A. galli* and *H. gallinarum* of exotic chickens in DZARC( Debrezeit Agricultural Research Center) poultry farm

Parasites	No. examined	No. infected	Prevalence (%)
<i>A. galli</i>	101	12	16 (15.84)
<i>H. Gallinarum</i>	101	3	6 (5.94)
Total	202	15	22 (21.78)

Table 4: Overall prevalence of *A. galli* and *H. gallinarum* of exotic chicken in DZARC (Debrezeit Agricultural Research Center) poultry farm based on sex and age

Parasites	No examined	No infected	Prevalence (%)		Prevalence (%)	
			M	F	Young	Adult
<i>A. galli</i>	101	12	7 (14.58%)	9 (16.98%)	9 (16.07%)	3 (6.66%)
<i>H. gallinarum</i>	101	3	4 (8.33%)	2 (3.77%)	2 (3.57%)	1 (2.22%)
Total	201	15	11 (22.91%)	11 (20.75%)	11 (19.64%)	4 (8.88%)

M= male; F= female

Of the 101 exotic chickens examined 15.84% and 5.94% were infected with *A. galli* and *H. gallinarum* respectively (Table 3). 21.78% of the exotic chickens were infested by these parasites (Table 3).

Out of 101 exotic chickens examined from DZARC poultry farm. The difference in the prevalence of *A. galli* was not statistically significant ( $P>0.05$ ) on the basis of breed 15.84% and age group 16.07% in young and 6.66% in adult. Whereas, there was statistically significant difference ( $P<0.05$ ) in sex: male 14.58% and female 16.98%. In *H. gallinarum*, there was statistically significant difference ( $P<0.05$ ) in breed 5.94%. However, there was no statistically significant difference ( $P>0.05$ ) between age: young 3.57% and adult 2.22% as well as sex: male 8.33% and female 3.77% (Table 4).

## DISCUSSION

Poultry farm is increasing in the developed and developing countries. It is a source of economy especially in developing countries. Parasites are a devastating disease in farm level. Strict hygienic measurements are highly advisable to overcome the problems.

The present study has shown that occurrence of *A. galli* and *H. gallinarum* in local and exotic chickens in commercial farm with prevalence of 20.79% and 7.42% respectively. In *A. galli* the current study showed that there was no statistically significant difference ( $P>0.05$ ) between breed and age. However, there was statistically significant difference in sex. The prevalence of *A. galli* recorded in current study 20.79% was lower than findings by previous authors from various parts of Ethiopia 71.6% in Addis Ababa [13], 67.2% in Dire Dawa [18], 61.2% in Bahir Dar [4], 64.3% in Sodo [19], 47.3% in central Ethiopia [20], 35.6% in North East of Amhara Regional State [21] and 29.5% in central Ethiopia [22].

This lower prevalence is most probably due to the fact that previous studies were conducted in backyard or scavenging system of management that is characterized by more poor sanitation, housing and lack of feeding. Infestation with *A. galli* in chickens is usually associated with retarded growth, blood loss, diarrhea, emaciation,

droopiness and reduction in egg production. In highly parasitized chicken it also causes obstruction of intestine [12], North [13], Smith [16], Gedion [19], Bersabeh [21] and Helina [23].

*H. gallinarum* was recorded with prevalence of 7.42% in Debrezeit Agricultural Research Center poultry farm. In this study, there was statistically significant difference ( $P<0.05$ ) in the prevalence of *H. gallinarum* in breed. However, the difference in the prevalence of age and sex was not found statistically significant ( $P>0.05$ ).

The prevalence was lower than the previous study in Ethiopia: 21.05% in Addis Ababa [13], 27.17% in Dire Dawa [18] and 43.24% in central Ethiopia [20]. In other countries, in Sudan the prevalence of *H. gallinarum* from Zoka farm was reported to be 60% [24] and 100% from Zimbabwe [10], Tanzania [7]. This caecal worm has a pathogenic effect in massive infections that causes digestive disorders and is very important when it harbors *Histomonas meleagridis* [17].

The present study indicated that local and exotic chickens kept under intensive management system in DZARC poultry farm were exposed to infections by both *A. galli* and *H. gallinarum*. Poultry production system in Ethiopia shows a clear distinction between the traditional low input system and the modern production system that uses relatively advanced technology. Traditional poultry production system operates indigenous chickens using a small sized flock without input and with poor or no housing facilities [2].

Modern poultry production system mainly focused on the introduction of exotic breeds to the country and distribution of the breeds to the farmers. However, the great majority of poultry production is based on extensive rural production system [2]. Management has a great role in controlling parasites. In addition to good management and regular deworming can also reduce the effect of economically important parasites [2].

## CONCLUSION AND RECOMMENDATIONS

The present study indicated that local and exotic chickens kept under intensive management system in

DZARC poultry farm were exposed to infection by both *A. galli* and *H. gallinarum*. This suggests that both species of parasites contribute to the loss in economical, problems in health and productivity of chicken kept on the farm. Hence, the farm should practice periodical deworming and all measures that reduce and prevent these parasites. Based on the above conclusion, the following recommendations were suggested:

- All the sanitation measures such as regular cleaning, uses of disinfectant before entrance of new chicken to the farm
- Farm should use antihelminthics properly in addition to vaccination of viral and bacterial diseases.
- Further studies should be conducted on the economic importance of these parasites.
- Avoid over-crowding of chicken in the house.
- Old aged birds should be kept separated from younger ones.
- Further studies should be conducted on epidemiology of parasites

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#### REFERENCES

1. CSA, 2004. A survey of ectoparasites and gastrointestinal helminthes of back yard chickens in three selected agro climatic zones in central Ethiopia. DVM thesis Faculty of Veterinary Medicine, Addis Ababa University, Ethiopia, pp: 1-22.
2. Tadelle, D., 1997. Study on village poultry production system in the control high lands of Ethiopia. MSc thesis, University of Uppsala, Sweden, pp: 1-22.
3. Alamargot, J., 1987. Avian pathology of industrial farm in Ethiopia. First National Livestock improvement conference, Addis Ababa Agricultural Research Institute, in IAR Proceeding, pp: 114-117.
4. Alemu, 1995. Poultry production in Ethiopia. World's poultry science. Journal, pp: 197-201.
5. Aklilu, H., 2007. Village poultry in Ethiopia. Socio-technical analysis with Farmers, PhD thesis, Wageningen University, Wageningen, Netherland, pp: 1-280.
6. Nasser, M., 1998. Oral New castle disease vaccination trails and studies on Newcastle disease in Ethiopia, MSc thesis, Faculty of Veterinary Medicine, Addis Ababa University and Freie University, Berlin, pp: 35-85.
7. Permin, A., H. Mogwish, A. Kassuku, P. Nansens and B. Bisgord, 995. A cross-sectional study of gastrointestinal helminth infection in rural scavenging poultry in the morogoro region of Tanzania in Relation to Season and Climate L-9.
8. Poulsen, J., A. Permin, O. Hindsbo, L. Yelifari, P. Nansen and P. Bloch, 000. Prevalence and distribution of gastrointestinal helminths and haemoparasites in young scavenging chickens in upper eastern region of Ghana, West Africa. Prev. Vet. Med., 45: 237-245. doi: 10.1016/S0167-5877(00)00125-2.
9. Ssenyong, G.S.Z., 1990. Prevalence of helminth parasites of domestic chicken in Uganda. Tropical Animal Health and Production, 14: 201-204.
10. White, M. and F. Brick, 1989. Avian disease manual 3<sup>rd</sup> ed. New Boston Center, Hunt Publishing, pp: 150-159.
11. Tanse J. and V.S. Pandey, 1989. Observation on helminthes parasite of domestic chicken in Zimbabwe, 20: 1-15.
12. Kaufman, J., 1996. Parasitic infections of domestic animals. A diagnostic manual, Basel; Berlin, pp: 338-394.
13. North, M.O., 1984. Commercial chicken production. Manual 3<sup>rd</sup> ed. Published by Van Nostry and Reinhold, New York, pp: 50-88.
14. Abebe, W., T. Asfaw, B. Genete, B. Kassa and P. Dorchies, 1997. Comprehensive studies of external parasite and gastrointestinal helminthes of chickens kept under different management system in and around Addis Ababa, Ethiopia. Revue Med. Vet., pp: 407-500.

15. NMSA, 1999. Rain fall and temperature data of National Metrological Service Agency, Addis Ababa, Ethiopia, pp: 660-950.
16. Smith, A.J., 1990. Tropical Agriculturalist Macmillan publisher; Hong Kong, pp: 162-178.
17. Gordon, R.F., 1982. Poultry diseases. Baillere Tindalle, 2<sup>nd</sup>. Great Britain, pp: 166-197.
18. Calnek, B., J. Barness, C.W. Bread, W. Reid and J.H. Yoder, 1991. Disease of poultry .9<sup>th</sup> ed. Low University Press, pp: 723-778.
19. Gedion, Y., 1991. A preliminary survey of ectoparasites and gastrointestinal helminth of local chicken in and around Dire Dawa. DVM thesis, Faculty of Veterinary Medicine, Ethiopia, pp: 21-37.
20. Teshome, M., 1993. Preliminary survey of gastrointestinal helminthes in local chicken in and around Sodo. DVM thesis, Facility of Veterinary Medicine, Addis Ababa University, pp: 1-8.
21. Bersabeh, T. and K. Awoke, 1987. Survey of gastro intestinal helminthes of local chickens in and around Bahir Dar, DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debrezeit, Ethiopia, pp: 1-18.
22. Eshetu, Y., E. Mulualem, H. Ibrahim, A. Berhanu and K. Abera, 2001. Study of gastrointestinal helminth of scavenging chicken in four rural districts of Amhara region, Ethiopia, pp: 120-450.
23. Helina, M., 2000. Epidemiology of gastrointestinal helminthes and ectoparasites of back yard poultry in three selected agro climatic zone in central Ethiopia. DVM thesis Faculty of Veterinary Medicine, Addis Ababa University, Debrezeit, Ethiopia, pp: 1-19.
24. Urquhart, G.M., J. Armour, J.L. Duncan, A.M. Dunn and F.W. Jennings, 1987. Veterinary Parsasitology. Churchilliving stone inc. New York, pp: 8-170.
25. Eisa, A.M., 1976. Helminth parasite of local and exotic breed of poultry in Sudan. Sud. J. Vet. Sci. Anim. Husb., 17: 68-76.