Prevalence of Chicken Cestodiasis in Egypt

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Abstract: Eight hundred and sixty chickens of different ages representing all types of production were collected either morbund or freshly dead. Thirty-Seven birds out of 860 examined chickens, showed infestation with different types of cestode worms with percentage of 4.3%. The recorded species of cestodes were Raillietina tetragona, Raillietina echinobothrida, Raillietina cesticillus, Choanotaenia infundibulum and Raillietina ransomi in an incidence percentage of 97.2%, 91.9%, 59.4%, 40.5% and 18.9% respectivelly. Raillietina ransomi was the first record in Egypt. The cestode infestation incidence in back yards; breeders; SaSo broiler; layer and broilers were 45.9%; 29,7%; 18,9%; 5.4% and 0% respectivelly. The highest incidence was recorded in backyard chickens while no infestation was recoded in broilers.

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1. Introduction:

Intensive breeding of poultry lead to an increased problems facing the poultry industry that was emerged during last four decades. Among the problems facing extensive types of production of chickens in Egypt are parasitic diseases. Helminthiasis was considered to be important problems in chickens **(Jansen and Pandey 1989)** and **(Abebe et al., 1997).** Helminthe parasites were increminated as major causes of unsoundness and lowering performance of poultry in Egypt **(Khater, 1993)**. Avian cestodiasis constitutes one of the most common endoparasitism causing serious troubles in chicken production. Chicken cestodiasis not only cause loss of body weight of the raised chickens but also may cause several problems in affected flocks such as enteritis, loss of blood, loss of production, nervous manifestations and death **(Calneck et al., 1997)**. Also, cestodes specially Davanea spp. penetrate deeply into an intestinal mucosa and produce marked enteritis which is frequently hemorrhagic in heavy infestation (**Soulsby, 1982)**. The tapeworm infestation incidence had often increased in free range system or in back yard flocks. These parasites are found more frequently in wormer seasons of breeding, when an intermediate host is abundant. Many species of tape worms are now recorded in intensive poultry breeding farms because the birds become in contact with intermediate host in deep litters, beetles and house flies inhabiting poultry farms (**Reid and McDougald 1997)**. This study was planned to record the prevalence and incidence of different species of cestodes affecting chickens and clinical findings of infested chickens.

2. Material and Methods

A. Materials

A.1. Examined chickens

Eight hundred and sixty chickens of different ages and breeds (back yards broiler, Saso, Layers, and Breeders) were collected either from moribund or freshly dead birds from poultry farms and backyards were collected during period extended from March 2005 till July 2007. These samples were subjected to clinical, postmortem and parasitological examinations.

A.2. Chemicals and reagents:

Physiological saline (0.9% sodium chloride)
Acetic acid
Potassium alum
Carmine saline (powder)
Concentrated Hcl
Clove oil
Canada balsam
Formalin 10%
Xylene
Ethyle alcohol (different concentration)
Paraffin wax
Distilled water

A.3. Stains:

Acetic acid alum carmine stain: was used for staining of adult cestode worms

B. Methods:

B.1. Clinical examination of collected moribund chickens:

The clinical examination of moribund chickens was carried out. The clinical signs, breed, age and type of production were recorded.

B.2. Post mortem examination and collection of cestodes:

The post mortem examination of both sacrificed and freshly dead chickens was carried out. The gross lesions were recorded.

B.3. Parasitological examination:

Carried out after **(Fahmy 1994).** The cestodes were collected for further identification inaccordance to **(Soulsby 1982)**.

B.4. Fixation of the specimens:

Carried out after (**Kruse and Pritchard, 1982** and **Beaver et al., 1984).**

B.5. Preparation of the acetic acid alum carmine stain: carried out after **(Gad 1987).**

B.6. Staining technique: carried out after **(Gad 1987)**.

B.7. Examination and differentiation of collected worms:

The stained worms were examined, differentiated and diagnosed in accordance to **(Soulsby 1982)**.

3. Results

3. 1 Clinical Findings

The clinical examination of examined affected chickens showed symptoms varies in severity inaccordance to age and breed. The clinical symptoms were ranged from subclinical to sever symptoms and death. The examined chickens showed dullness, emaciation, weakness, reduced growth and convulsions and some birds showed paralysis as shown in Fig. (1). Inaddition examined layers and breeders showed uneven body weights and decreased egg production

3. 2- Post mortem Findings:

The post mortem examination of both freshly dead and sacrificed examined chickens revealed no specific gross lesions. Occasionally, some examined chickens revealed emaciation of breast muscles and protrusion of the keel bone. Chronic catarrhal enteritis, hemorragic enteritis, nodular enteritis and mucoid diarrhea. The intestine showed heavy infestation with cestodes as shown in Fig. (2) ; Fig.(3); and Fig. (4).

3.3- Parasitological Findings:

3.3-1- Parasitological Findings of naturally infected Chickens:

The parasitological examination of 860 examined chickens recorded the cestodes infestation in an incidence 4.3%. Five species of cestodes were recorded and identified as Railleitina tetragona, Railleitina echinobothrida, Railleitina cesticillus, Choanotaenia infundibulum and Railleitina ransomi with prevalence incidence percentage of 4.2%; 3.95%; 2.6%; 1.74% and 0.81% respectively.

3.3-2- Characterization of recorded cestodes:

3.3.2.1 Raillietina tetragona:

Large, robust cestodes, measuring up to 35 cm long. The scolex is oval in shape, the rostellum armed with double rows of T- shaped hooks. The suckers are oval in shape also armed with 8-10 rows of hammer – shaped hooks of different size. The scolex is followed by long very narrow neck. The mature segment is longer than broad and the common genital pores are single and being in front of the anterior 1/3 of the lateral margin of the mature segment (Fig. 5).

3.3.2.2. Raillietina echinobothrida:

Macroscopically resemble Raillietina tetragona but shorter (up to 25 cm long) and with shorter neck. The scolex is spherical in shape, the rostellum is retractile and armed with about 200 T shaped hooks that located in two rows. The suckers are nearly rounded and armed with 8-10 rows of hammer- shaped hooks. The neck is short and broad. The mature segmant is longer than broad (Fig. 7).

3.3.2.3. Raillietina cesticillus:

Macroscopically is about 15 cm long and the anterior border of the segment are shorter than posterior one. The scolex is cylinderical or nearly globular in shape and smaller in size. The suskers are not clear. The rostellum is hemispherical and being surrounded with prominent lip. The neck is absent, the anterior segment increased in size until they became inverted funnel shaped and the posterior border overlaps the anterior border of the next segment (Fig. 6).

3.3.2.4. Raillietina ransomi:

Large robust cestode macroscopically ranged from 5-8 cm long with triangular shaped anterior portion, the scolex has a broad rostellum, the rostellum armed with single row of small hooks (32 µl in size). The suckers are 4 in number, cup-shaped and unarmed. The worm has long and broad neck, the mature segment is broader than long. The segments are markedly wider poseriorly than anteriorly giving the worm a characteristic saw edge appearance (Fig. 8).

3.3.2.4. Choanotaenea infundibulum:

Macroscopically the scolex is triangular in shape which is pointed anteriolly. The worm is measured 10-15 cm long, ther are 15-20 rostellar hooks arranged in single row, the suckers are oval in shape, the neck is narrow, short and folloed by few very broad segments which gradually increased in length. The mature segments are usually more or less bell shaped, broader

posteriorly than anteriorly with pointed posterior corners giving the worm serrated apearance (Fig. 9, 10).

3.4. Incidence of recorded cestodes during examination period:

The Incidence of recorded cestodes was varried inaccordance to breeding season. Raillietina tetragona was recorded in a high incidence (100%) during December, April, May, July and September meanwhile, in a low incidence during February (50%) and not recorded during March, June, August, October and January. Moreover, highest infestation incidence of Raillietina echinobothrida was recorded during April, May, July, September, November and February 100% and with lowest infestation incidence during December (40%) and not recorded during March, May, June, August, October and January. Furthermore, the highest infestation incidence of Raillietina cesticillus was recoded during April, September and November 100%; with lowest infestation incidence during July (50%) and not recoded during March, May, June, August, October, December. The infestation incidence of Choanotaenia infundibulum during September 100%; with lowest incidence during Fabruary and July and not recorded during other examination periods at the rest of the year. In addition, Raillietina ransomi infestation incidence was much lower in comparison with other recorded Raillietina species. The infestation incidence of R. ransomi during Fabruary and April and during July and September was 50% and 25% respectively and not recorded during other months of examination period. (Table 1 and Histogram 1).

3.5. Seasonal variations:

Seasonal variation incidence of cestodes:

The recorded cestodes during this study and infestation incidence at different seasons of breeding was varies. The highest incidence was recorded at summer 5.54% and Autum 5.6% and lowest incidence during Winter 3.3% and Sring 2.2%. as shown in Table (2) and Histogram (2). The infestation incidence of Raillietina tertragona, Raillietina echinobothrida, Raillietina cesticellus, Choanotaenia infundibulum and Raillietina ransomi during Winter season were 16.12% ; 10.81% ; 0% ; 2.7% ; and 2.7% respectively and during Summer season were 32.43% ; 32.43% ; 16.21% ; 16.21% and 8.1% respectively; and during Spring season were 10.18% ; 10.18% ; 5.4% ; 0% and 2.7% respectively; and during Autum season were 37.38% ; 37.38% ; 37.38% ; 21.62% and 5.4% respectively. Table (3) and Histogram (3).

3.5.3. Type of production variations of Cestodes incidence:

The infestation incidence of recorded cestodes was varied inaccordance to type of production. Back yard chickens, Layers, Breeders, Saso and Broilers, cestodes infestation incidence were 45.95%; 5.41%; 29.73%; 18.92% and 0% respectively. The highest infestation incidence of cestodes was recoded in back yard 45.95% while, the lowest incidence of cestodes was recorded in broiler flocks 0%. Table (4) and Histogram (4).

3.5.4. Age variations of Cestodes infestation incidence:

The most susceptible age of backyard chickens infested with cestodes during this study was from 70-100 days-old; of layers was 350-370 days-old; of breeders was 270-290 days-old and of Saso native chickens was 60-79 days-old. Table (5) and Histogram (5).

Fig. (1) Cestodes infested chickens showed depression, inactivity, drooped wings, paleness of visible mucous membrane.

Fig (2) Breast muscles of infested chickens showed emaciation of breast muscles and protrusion of the keel bone.

Fig (3) Intestine of infested chicken with cestodiasis, the intestine is swollen due to its contents of cestodes and the wall show Inflammation

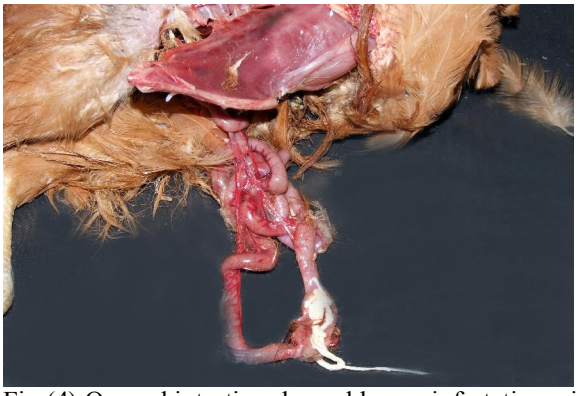


Fig (4) Opened intestine showed heavy infestation with cestodes

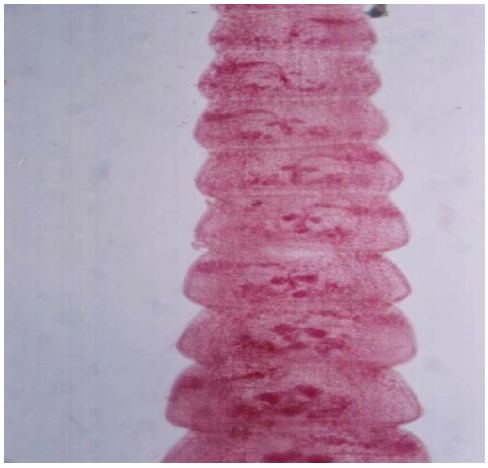


Fig . (5) Raillietina tetragona mature segment X10 mounted in carmine stain

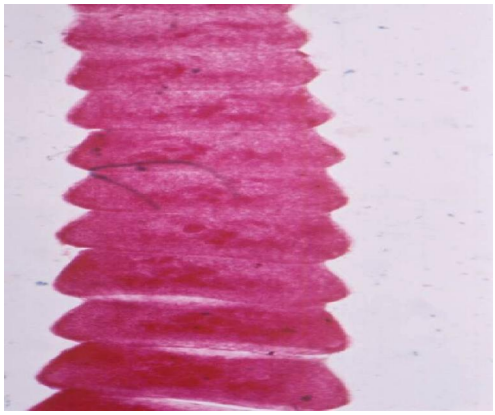


Fig . (6) Raillietina cesticillus mature segment X10 mounted in carmine stain

Fig. (7) mounted in carmine stain Raillietina echinobothrida mature segment X 10

Fig . (8) Raillietina ransomi mature segment X10 mounted in carmine stain

Fig. (9) and Fig. (10) Choanotaenia infundibulum mature segment X10 mounted in carmine stain.

Table (1) : Monthly incidence of different types of

Month	No of ex cases	No of +ve cases	*R.tetra.*		*R.echin.*		*R.cest.*	
			No	*%	No	*%	No	*
March	70	0	0	0	0	0	0	0
April	60	2	2	100	2	100	2	10
May	50	2	2	100	2	100	0	0
June	70	0	0	0	0	0	0	0
July	80	12	12	100	12	100	6	5
August	70	0	0	0	0	0	0	0
Sept	100	8	8	100	8	100	8	10
Oct	70	0	0	0	0	0	0	0
Nov	80	6	6	100	6	100	6	10
Dec	80	5	5	100	2	40	0	0
Jan	70	0	0	0	0	0	0	0
Feb	60	2	1	50	2	100	0	0
Total	860	37	36	97.2	34	91.9	22	59
**% to total		4.30	4.19		3.95		2.56	

*** The % compared to +ve cases**
**** The % compared to the total examined number**

Table (2) : Seasonal incidence of recorded cestodes during this investigation

Season	Number of Examined chickens	Number of Infested chickens	% of cestodes infestation
Spring	180	4	2.22
Summer	220	12	5.45
Autumn	250	14	5.6
Winter	210	7	3.33
Total	860	37	4.30

Table (3) : Seasonal incidence of each species of recorded cestodes during this investigation

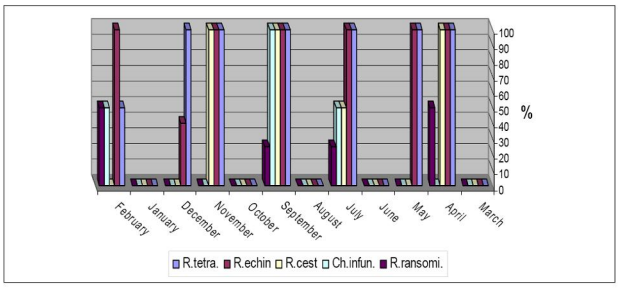
Season	Positive cases		R. tetragona		R. echino		R. cesticillus		Ch infun.		R. ransomi	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Spring	4	10.81	4	10.81	4	10.81	2	5.4	0	0	1	2.7
Summer	12	32.43	12	32.43	12	32.43	6	16.21	6	16.21	3	8.1
Autumn	14	37.83	14	37.83	14	37.83	14	37.83	8	21.62	2	5.4
Winter	7	18.91	6	16.21	4	10.81	0	0	1	2.7	1	2.7
Total	37	100	36	97.28	34	91.88	22	59.44	15	40.53	7	18.9

Table (4) : Seasonal incidence of cestodes in different examined breeds

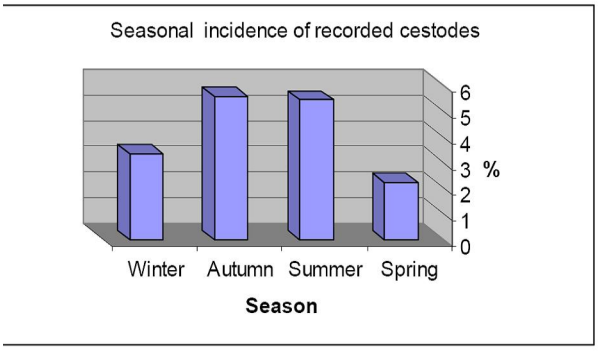
Season	Number of Infested chickens	Free range		Layer		Breeder		Saso		Broiler	
		Number	%	Number	%	Number	%	Number	%	Number	%
Spring	4	2	50	0	0	1	25	1	25	0	0
Summer	12	5	41.7	1	8.33	3	25	3	25	0	0
Autumn	14	7	50	1	7.14	4	28.5	2	14.2	0	0
Winter	7	3	42.8	0	0	3	42.8	1	14.2	0	0
Total	37	17	45.9	2	5.40	11	29.7	7	18.9	0	0

Table (5): Percentage of cestode infestations in different types of production in the examined chickens with relation to the age average of the examined chickens

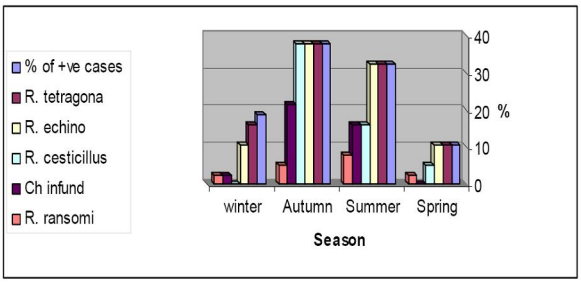
Type of production	Number of examined poultry houses	Number of examined chickens	Age average (days)	% of cestodes infestation
Broiler	24	240	38	0
Saso	36	360	68	18.92
Breeder	12	120	280	29.73
Layer	8	50	360	5.41
Free range	12	60	85	45.95



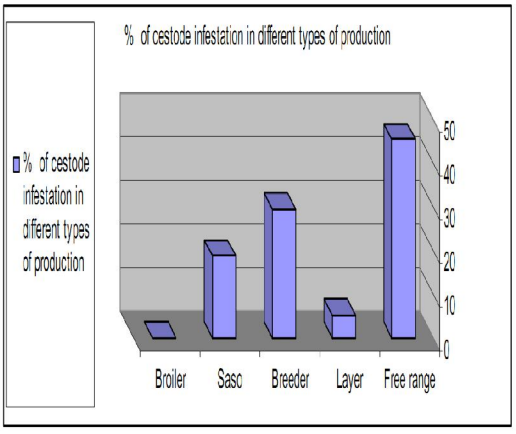
Histogram (1) : Monthly incidence of different types of recorded cestodes



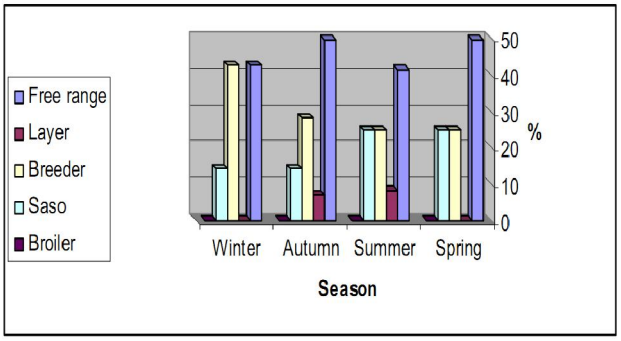
Histogram (2) : Seasonal incidence of cestode infestation during this investigation



Histogram (3) : Seasonal incidence of different types of recorded cestodes



Histogram (5) : Percentage of cestode infestation in different types of production



Histogram (4) : Seasonal incidence of cestodes in different types of production in the examined chickns

4. Discussion

A high percentage of chickens may be infested with tapeworms if they are reared in backyard flocks. These parasites are found more frequently in warmer seasons (like Egypt), when intermediate hosts are abundant.

The present study aimed to clarify the identification, seasonal variation and the incidence of cestode helminthes infesting the domestic chickens in poultry farms (different types of production) and backyards.

The examined birds during this study showed clinical signs in the form of dullness, emaciation, weakness, reduced growth, uneven body weights and decreased egg production. Meanwhile, the postmortem examination revealed gross lesions in the form of emaciation, chronic catarrhal enteritis, hemorrhagic enteritis, nodular enteritis and mucoid diarrhea. These findings were similar to results obtained by (Levine, 1938), (Botero and Reid, 1969), (Nadakal et al., (1973) (Nadakal and Nair, 1979), and (Calneck et al., 1997).

The morphological features and general measurmnents of recovered of Raillietina tertragona in the present investigation were agreed with the

findings of El – Azzazy, (1979); Soulsby, (1982)), Mahdy and Olfat (1988); Ramadan and Abouzanda, (1989); El – Gayer and Amal (1992); Sayed and Gehan (1996) and Ahmed-Nabila (2004)

Also, the morphological features and general measurements of Raillietina echinobothrida recorded in this study were agreed with that mentioned by Reid (1962); El – Azzazy (1979); Soulsby, (1982)), Mahdy and Olfat (1988); El – Gayer and Amal (1992); Urqhart et al., (1996) and Ahmed and Nabila (2004).

The morphological features and measurements of recoded Raillietina cesticillus in this investigation were similar to that mentioned by El – Azzazy (1979); Soulsby, (1982)); Mahdy and Olfat (1988); Ramadan and Abouzanda (1989), and Sayed and Gehan (1996). Meanwhile, the morphological description of Choanotaenia infundibulum was found coincided with those mentioned by Broadbent, (1942); Reid, (1962); Soulsby, (1982)); Permin and Hansen (1998) and Ahmed, (2004). Furthermore, Raillietina ransomi recovered in this study was first record in Egypt. Reid (1962) recorded that as one of the most important cestode helminthes affecting turkey in U.S.A. The morphological features and measurements of R. ransomi were similar to the findings of Williams, (1931) and Reid (1962).

The prevalence percentage of cestodes infestation in this study was 37 out of 860 examined chickens (4.3%) were found to be infested with cestodes, this incidence percentage was disagreed with the result obtained by Sukpanyatham et al., 1982 (74.42%); Hayat et al., 1983 (48.9%); Virk, et al., 1987 (76.5%); Mahdy and Olfat 1988 (27.62%); El–Gayar and Amal (1992) (28.5%); and Ahmed and Nabila 2004 (12.9%). This may be attributed to improvement of management sanitation, regular use of insecticide and other biosecurity which affect the intensity of the intermediate host and consequently the incidence of cestode infestation.

Regarding to cestode species incidence in this investigation, Raillietina tetragona in the present study with an incidence 97.2%. This obtained finding was disagree with the results of Shamsul, Islam and Shaikh, (1967) 35%; El – Azzazy, (1979) 24.9%; Bilgees and Khan, (1985) 20.3% Ehlers, (1985) 33.66%; Samad et al., (1986) 37.69%; Umeche and Eno (1987) 25.3%; Mahdy and Olfat (1988) 10.95%: Tuli, (1989) 63.55%; El-Gayar and Amal (1992) 15.84%; Negmel –Din et al., (1994) 37.5%; Mpoame and Agbede, (1995)14.5%; and Ahmed-and Nabila (2004) 3.3%.

Raillietina echinobothrida incidence percentage was 91.9%. This findings was disagreed with the results obtained by Poulsen et al., (2002) 81%; also, higher than that mentioned by Shamsul , Islam and Shaikh, (1967) 45%; El- Azzazy, (1979) 11.5% ; Ehlers, (1985) 33.66% ; Barak et al., (1985) 0.3% ; Lauzao et al., (1985) 0.6% ; Hemalatham et al., (1987) 4% ; Umeche and Uno, (1987) 25.3% ; Samad et al., (1986) 53.07% and Ahmed and Nabila (2004) 1.7%.

In addition, Raillietina cesticillus incidence percentage was 59.4% which was higher than the results mentioned by Abebe et al., (1997) 37.8% ; also , higher than those obtained by Barak et al., (1985) 5.7% ; Lauzao et al., (1985) 7.2% ; Mahdy and Olfat (1988) 3.57% ; Ramadan and Abouzanda, (1989) 9.37% ; Negmel- Din et al., (1994) 0.96% ; Sayed and Gehan ; (1996) 2.88% ; Shamsul Islam and Shaikh, (1967) 20%; Samad et al., (1986) ; 25.03% ; Tuli, (1989) 24.57% and Poulsen et al., (2002) 12%. Meanwhile, Choanotaenia infundibulum percentage incidence was 40.54% which was higher and disagreed with the results obtained by Abebe et al., (1977) 22.16%; El - Azzazy, (1979) 16.8%; Barak et al., (1985) 1.7% ; Tuli, (1989) 1.69% Lauzao et al., (1985) 2.2% and Ahmed and Nabila (2004) 1.7%. Furthermore, Raillietina ransomi incidence percentage was 18.9% and this was the first record in Egypt. Regarding to incidence percentage of cestodes and type of poultry production in this investigation, the highest infestation percentage was recorded in (Backyard) (45.95%) followed by Breeders (29.73%) then Saso broilers (18.92%) then Layers (5.41%) and not detected in broilers (0%). Moreover, the relationship between age of chickens and the incidence percentage of cestodes infestation during this study. The most susceptible ages of backyard chickens was 70 -100 days old; of layer flock was 350-370 days-old; of breeders was 270-290 days-old and of Saso chickens was 60-79 days-old. Finally, it could be concluded that chicken cestodiasis represent one of pathological condition causing economic losses in poultry industry in Egypt. The prevalence incidence percentage of cestodes was 4.3%. The most prevalent chicken cestodes were Raillietina tetragona, Raillietina cesticillus, Raillietina echinobothrida, Choanotaenia infundibulum and Raillietina ransomi. Raillietina ransomi was first record in Egypt.

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References

1-Abebe, W.; Asfaw, T.; Genete, B.; Kassa, B. and Drochies, P. (1997): Comparative studies of external parasites and gastrointestinal helminthes of chickens kept under different management

system in and around Addis Ababa. Revue de Medicine veterinaire, 148(6):497-500 Cited by Yara M.A (2005).

2-Ahmed and Nabila, S.I. (2004) : Some studies on parasitic helminthes infecting domestic chicken in Beni –Sueif Governorate . M.V.SC. Thesis; Faculty of Vet. Med.; Cairo University.

3-Barak, G.; Lauzao, Z. and Cruz, C.A. (1985): The helminthes of chicken in the state farms of Holguin province. Revista cubana de Ciencias Veterinaries, 16(2):157-163.

4- Beaver K.G.; Jun R.C., and Cupp E.W. (1984): Clinical parasitology .U.S.A Lea Febiger, Philadelphia.

5-Bhowmik, M.K. and Sinha, P.K.(1982): Seasonal distribution of cestodes in domestic fowl of west Bengal . Indian Journal of Poultry Science, 17(1):72-73.

6-Bilgees, F.M. and Khan, A.(1985): The incidence of parasitic infection in fowls of Karachi .Pakistan Journal of Zoology, 17(3):306-308.

7-Botero H. and Reid W.M(1969): The effects of the tapeworm Raillietina cesticillus upon body weight gains of broilers, poults and on egg production. Poultry Science.; 48(2):536-542.

8-Broadbent, M. (1942): A survey of the incidence, distribution and prevalence of the helminthes parasites of domestic fowl in Queenland. Asul. Vet.J. 18:200-204.

9-Calneck B.W.; Barnes HJ. Beard C.W.; McDougald L.R. and Saif Y.M. (1997): Diseases of Poultry 10th Ed.Editorial Board for the American Association of Avian Pathologists. Mosby – Wolfe.

10-Ehlers, B.S. (1985): Survey of parasitic helminthes of poultry. Thai Journal of Veterinary Medicine, 15(4):267-276.

11-El - Azzazy, O.M. (1979): Studies on helminth parasites of poultry in Sharkia governorate. M.V.Sc. Thesis, Fac. Vet. Med. Zagazig University.

12-El-Gayar and Amal, K. A. (1992): Some studies on enteric helminthes of chickens in Ismailia province .M.V.Sc. Thesis, Fac. Vet. Med. Suez Canal Univ.

13-Fahmy, M.A.M.(1949) : Investigation of some parasites of poultry M.V.Sc. Thesis, (Parasitology). Fac. Vet. Med., Cairo University.

14-Gad, N. A.A. (1987): Studies on some parasitic helminthes in domestic birds in Assiut governorate. M.V.Sc. Thesis, Fac. Vet. Med., Assiut University.

15-Hayat, B. and Hayat, C.S. (1983) : Incidence of intestinal parasites of chicken in Faisalabad District . Pakistan Veterinary Journal, 3(4): 165-167.

16-Hemalatham E.A.; Rahman, S.A. and Jagannath, M.S. (1987) : Helmenthic infection in domestic fowls reared on deep litter and cage system . Mysore Journal of Agricultural Science, 21 (3):338-341.

17-Jansen, J. and Pandey, V.S. (1989): Observations on Helminth Parasites of Domestic Fowls in Zimbabwe. Zimbabwe Veterinary Journal 20 (1): 15-17.

18-Khater, H.F.(1993) : Studies on enteric helminth parasitites in domestic birds . M.V.Sc. Thesis. Fac. Vet. Med. Banha, Zagazig University.

19-Kruse O.W. and Pritchard M.H. (1982) : The collection and prevention of animal parasites . Technical Bullation Bulletin, I. University of Nebraska Lincoln and London, p.141.

20- Lauzao, Z,; Barak, G. ; Montero , D . And Croz, C.A. (1985): The efficacy of fecal examination for the diagnosis of helminthiases in domestic chickens, Revista – Cubana de Cienias Veterinarias, (16-2) : 153-155.

21-Levine , P.P.(1938): The Effect of Infection with Davainea proglottina on the weights of growing chickens The Journal of Parasitology, Vol. 24, No. 6, pp. 550-551.

22- Mahdy and Olfat, A. (1988): Studies on parasitic worms infesting chickens and ducks in Giza governorate, Egypt. M.V.Sc. Thesis, Fac. Vet. Med.; Cairo University.

23-Mpoame M. and Agbede G. (1995): The gastrointestinal helminth infections of domestic fowl inDechang, Western Cameroon. Revue D'Élevage et de Médicin Vétérinaire des Pays Tropicaux 48 (2): 147-151. Cited by Yara M.A (2005) .

24-Nadakal, A. M. and Nair, K. V. (1979): Studies on the metabolic disturbances caused by Raillietina tetragona (Cestoda) infection in domestic fowl. Indian J Exp Biol 17:310—311.

25-Nadakal, A. M; Mohandas,K. K ; John,O and Muraleedharan, K. (1973): Contribution to the biology of the fowl cestode Raillietina echinobothrida with a note on its pathogenicity. Trans Am Microsc Soc 92:273—276.

26-Negmel – Din, M .M; Mahdy, A. Olfat and Mousa, W. M. (1994): Observations on some helminth fauna affecting the Egyptian domestic fowl (Gallus gallus domesticus) with special reference to Fimbriaria fasciolaris . J. Egypt. Vet. Med, Ass. 54 (2) : 137 -143 .

27-Permin A. and Hansen, J. W. (1998): Epidemiology, diagnosis and control of poultry parasites. FAO Rome.

28-Poulsen, J.; Permin A.; Hindsbo, O.; Yelifari, L.; Nansen, P., and Bloch, P. (2002) : Prevalence and distribution of gastrointestinal helminthes and

haemoparasites in young scavenging chickens in upper eastern region of Ghana , West Africa . Prev. Vet. Med., 45(3-4): 237 – 245.
29-Ramadan, H.H. and AbouZnada, N.Y. (1989): Different Raillietina species (Cestoda: Davainieda) infecting domestic fowl in Saudi Arabia. Alex. J.Vet. Sci., 5 (2): 291 – 309.
30-Reid, W. M. (1962): Chicken and turkey tapeworms. Handbook. University of Georgia, Poultry Department: Athens, GA.
31-Reid, W. M., and McDougald, L. R. (1997): Cestodes and Trematodes. In Diseases of Poultry, 10th edition, pp. 850-864. Iowa State University.
32-Samad, M.A.; Alam, M.M.; and Bari, A.S.M. (1986): Effect of Raillietina echinobothrida infection on blood values and intestinal tissues of domestic fowls of Bangladesh. Vet. Parasitol..; 21 (4):279-84.
33-Sayed and Gehan, M. (1996): Some parasitological and immunological studies on parasites of chickens. M.V.Sc. Thesis, Fac. Vet. Med., Assiut University.
34-Shamsul Islam, A.W. and Shaikh, H. (1967): A survey of helminth infections in the gastrointestinal tract of domestic fowls in Mymensingh district, East Pakistan . Cylon Vet. J., 15(3):101-109.
35-Soulsby, E.J.L. (1982): Helminths, Athropods and Protozoa of Domesticated Animals. 7th Edition. 809 pp. Baillière Tindall, London, UK.
36-Sukpanyatham, N.; Notamingcharern, T.; Bhodigen, S.E. and Muangyai, M. (1982): A survey of parasites in native chickens. Thai. Journal of Veterinary Medicine, 12 (4), 227-237.
37-Tuli, J.S. (1989): Studies on cestode parasites of poultry. Department of Biomedical science, Medical School University of Birmingham, Edgbaston, Birmingham. B15 2 TT, UK.
38-Umeche, A. and Eno, R.O. (1987): A survey of parasites of chickens from poultry farms in Calabar, Nigeria. Revista - Latinoamericana de Microbiologica. 29(2):133-136.
39-Urquhart, G.M.; Armour, J.; Duncan, J. L.; Dunn, A. M. and Jennings, F. W. (1996): Veterinary Parasitology, 2nd ed. Blackwell Science Ltd .Osney Mead. Oxford Oel, London.
40-Virk, K.J.; Jain, M. and Prasad, R.N.(1987) : Qualitative and quantitative analysis of helminth fauna in Gallus gallus domesticus . Zeitschrift – Fur Angewwandte Zoologie, 74 (3):329-336.
41-Williams, J. L. (1931): Gastrointestinal helminths from turkeys in Southeastern United States. College Experiment station. University of Georgia, Athenes. Journal series pp. 261-262 Cited by Burton G.; Maxfield, W.; Malcolm R. and Frank A. (1963).

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