Ass. Univ. Bull. Environ. Res. Vol. 3 No. 2, October 2000

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A PILOT STUDY OF HEALTH IMPLICATIONS AND HISTOPATHOLOGICAL EFFECTS OF CESTODIASES ON COMMERCIAL BROILER FLOCKS FROM TWO DIFFERENT POULTRY HOUSING SYSTEMS WITH SPECIAL REFERNCE TO HISTOCHEMISTRY OF *ECHINOLEPIS CARIOCA*

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ABSTRACT :

Domestic fowls are susceptible to infestation by a large number of internal parasites, and it is safe to state that very few flocks are entirely free from them. The damage done by these unwelcome pests, both directly and indirectly, cannot be accurately calculated but it is undoubtedly of such magnitude as to constitute one of the major problems confronting the poultry industry.

The present study deals with the study of some poultry intestinal cestodes health troubles of commercial broilers ready for market from two variable poultry housing systems at different localities of Upper Egypt. As well as the study of the histopathological changes produced in the intestine of the examined broilers that infected with *Rai11ietina (skrjabinia) cesticillus.*, as the structure of their intestine undergoes degeneration of epithelial cells, infiltration of macrophages and lymphocytes, and proliferation of connective tissue, that suggested mild forms of enteritis. The recovered *Amoebotaenia cuneata* tapeworms were embedded and their scolices were burrowed in the intestinal mucosa with degenerative changes. Moreover, the histological study revealed presence of chronic inflammatory reaction and enteritis in fowls infected with *Echinolepis carioca.* It was revealed that, there was no significant correlation between the recovery of *Echinolepis carioca* and presence or absence of the recovered cestodes in the infested specimens. Moreover , no clear relationship between the percentages of apparently healthy signs and percentages of actually infested broilers

The incidence percentages of intestinal cestodes in commercial broiler flocks from different poultry farms in Upper Egypt revealed the presence of *Raillietina (skrjabinia) cesticillus* (69.23%), *Cotugnia megitti* (7.69%), *Echinolepis carioca* (10.77%) and *Amoebotenia cunneata* (12.31%). It could be concluded that, there was a significant correlation between the infested broiler body weight and the intensity of the tapeworm infestations. Moreover, the infestation percentages were increased with the decreased of body weight of examined broilers.

The overall incidence percentages of recovered broiler cestodes in the present study were 65% in the total examined commercial broilers and 80% & 50% in case of commercial broilers from flocks of the free-range and built-up litter systems respectively. So, the obtained results revealed the superiority of poultry housing in the built-up litter system rather than the free-range system in minimizing of the intestinal parasitic infestation of poultry flocks.

Furthermore, there was a marked depletion of polysaccharide complex in gut wall due to *Echinolepis carioca* infestation. A magnificent decrease in glycogen reserve of small intestines of the infested broilers with tapeworms suggested the possibility of glycogen utilization by the worm as food. Also a slight increase in mucin production as well as weak depletion of protein contents were noticed in case of examined infested broilers.

It is recommended that, most of intestinal parasitic infestations, particularly cestodes could be overcome in housing of poultry flocks by applying the basic principles of hygiene and excellent sanitation .

INTRODUCTION :

Parasitic affections of poultry flocks have caused serious and enormous losses to the poultry industry particularly in tropical and subtropical countries. The most health troubles varied from bird death in severe infestation or decrease of body weight and growth to other unhealthy signs of the infested fowls [1]. Worms are prolific and ever ready to establish themselves in susceptible hosts. The failure to institute appropriate measures of control will lead sooner or later, to decreased production, lowered returns, and in many cases to a high death loss. The devitalizing effect of parasites is an important factor in rendering fowls more susceptible to diseases. Poultry tapeworms infest the intestines causing hemorrhage and thickening of the intestinal walls, leading to poor feed absorption and poor growth. Tapeworms must be passed through an intermediate host, such as a snail, slug, earthworm, beetle or fly to become infected to other fowls. Tapeworms do not commonly cause severe pathology in poultry but rather live in the intestinal tract and compete with the host for the nutrients in ingested feed. Clinical signs may include, general unthriftiness, a hearty appetite, and weight loss. Tapeworm segments may be found in the poultry intestines and may pass in droppings.

A great deal of information is available on the pathological changes caused by adult cestodes in domestic and laboratory animals. Heavy infestations of dogs with *Dipyllidium caninum* and *Echinococcus granulosus* cause acute or chronic intestinal catarrh, small haemorrhages, hypertrophy of intestinal villi, atrophy of tubular gland and hyperplasia of connective tissues [2]. Lumsden and Karin [3] described an apical inflammatory response in mice infected with *Hymenolepis microstoma*. Such response was manifested by leucocytic infiltration of the peribiliary and pancreatic connective tissues within one week after exposure to cysticercoids, and it was soon followed by fibroplasia.

In case of poultry, the cestode infestations are reported to produce capillary congestion, slight lymphocyte and polymorpnuclear cell infiltration in the villi around the scolices, moderate proliferation of epithelial cells and areas of fibrosis containing active fibroblast [2].

In spite of such a keen interest in the subject, however, the pathological changes caused by adult and larval cestodes in common poultry that alter their health and production, have not actually received much attention. Studies on health troubles as well as, the histopathological effects of cestode scolices on the epithelium of the intestinal mucosa in poultry chickens were conducted, but a very little notice had been taken of the effects of such parasites on the tissues of infested fowls [4,5&6].

Cestodiasis and health implications in poultry have not received much attention because it causes mainly morbidity and rarely mortality. Nevertheless its effect on productivity should not be undetermined. Mazen [7] described a cestode *Biuterinoides aegypti* in the passerine birds of Assiut, Egypt. In the present study, survey and study of health shooting troubles of some intestinal poultry cestodes were conducted in commercial broiler flocks of two variable poultry housing systems, that included both of the free-range and built-up litter from different localities in Upper Egypt, and their pathognomic effects were determined clinically, histopathologically and histochemically.

MATERIALS AND METHODS :

Examined birds:

Total of 400 tested commercial broilers under experimentation were selected randomly and divided into 2 groups each of 2oo broilers. The birds were at age ready to market that obtained from poultry farms of two different poultry housing systems at variable localities of Upper Egypt, during march 1999 to march 2000. One group of 200 *Gallus gallus* of red broilers with age varied from 40-48 days in case of the free-range system and the other group of 200 *Gallus domesticus* of white broilers their age ranged from 40-46 days from the built-up litter system. All of the tested broilers were exposed to the following examinations :

Physical examination and clinical signs :

All physical examinations and constitutional vigor of the tested broilers were conducted for each bird separately, as body weight, primary signs of health and examination for soundness .

Incidence of tapeworms, lesions and cestodes diagnosis :

To find out the incidence and health implications of tapeworm infestations (cestodes), the viscera of commercial broilers were thoroughly examined. The tapeworms were collected when present and examined under a dissecting microscope and their numbers obtained from each infested fowl intestine were recorded.

The collected cestodes were flattened and fixed in 5% hot formalin for whole mounts for specific identification and later transferred to 10% formalin for preservation. The cestodes were stained with carmine. Dpx was used as mounting medium.

Diagnosis was done according to schmidt [8]. The procedures were readily made by visualizing the tapeworms; or identifying tapeworm segments or eggs in the examined broilers intestines and droppings. Preparation of specimens including compression, fixation and staining of usually procedures were applied. However, some scolices were examined while fresh, after being gently compressed between a slide and a cover slip, to visualize better the presence or absence of hooks.

Histopathological examination :

The examined broilers were scarified and examined for passing tapeworms progglottids. The site of attachment of cestodes was traced out leaving 1 cm stump; the rest of the strobila was snipped off. The infected gut was fixed in 10% neutral formalin. Paraffin sections were cut at 6-7μ thickness, and stained with haematoxylin and eosin for the microscopical examination.

Histochemical examination (Histo-chemistry) :

For histochemical studies, portions of small intestine of each examined broiler that naturally infested with *Echinolepis carioca* and other selected cestodes along with the control (counter parts) were selected. The stander methods of fixation and various histochemical procedures described by Culling and Pearse [9&10] were employed. The histochemical procedures used were periodic acid shiff stain (PAS) for polysaccharides, muci-haematin stain for mucin and mercury bromophenol blue for protein.

RESULTS AND OBSERVATIONS :

Table (1): Incidence distribution percentages of body weight and presence clinical signs of parasitic infestation of examined 400 commercial broiler chickens.

Range of body weight/Kg	Examined 400 commercial broiler chickens							
	Gallus gallus (red broilers)*				*Gallus domesticus*(white broilers)**			
	No. of examined broilers	No. of broilers show signs of infestation	Incidence %	Frequency %	No. of examined broilers	No. of broilers show signs of infestation	Incidence %	Frequency %
0.0 - 0. 5	-	-	-	-	-	-	-	-
0.5 – 1.0	75	53	26.5	70.7	87	58	29.0	66.7
1.0 – 1.5	62	29	14.5	46.8	63	21	10.5	33.3
1.5 – 2.5	50	18	9.0	36.0	36	11	5.5	30.5
2.0 – 2.5	13	1	0.5	7.8	14	0.0	0.0	0.0
Total No.	200	101	50.5		200	90	45.0	
Overall Incidence %	= 47.75%							

(*) = Age of examined broilers ranged from 40-48 days (Free-range system).
(**) = Age of examined broilers ranged from 40-46 days (Built-up litter system).

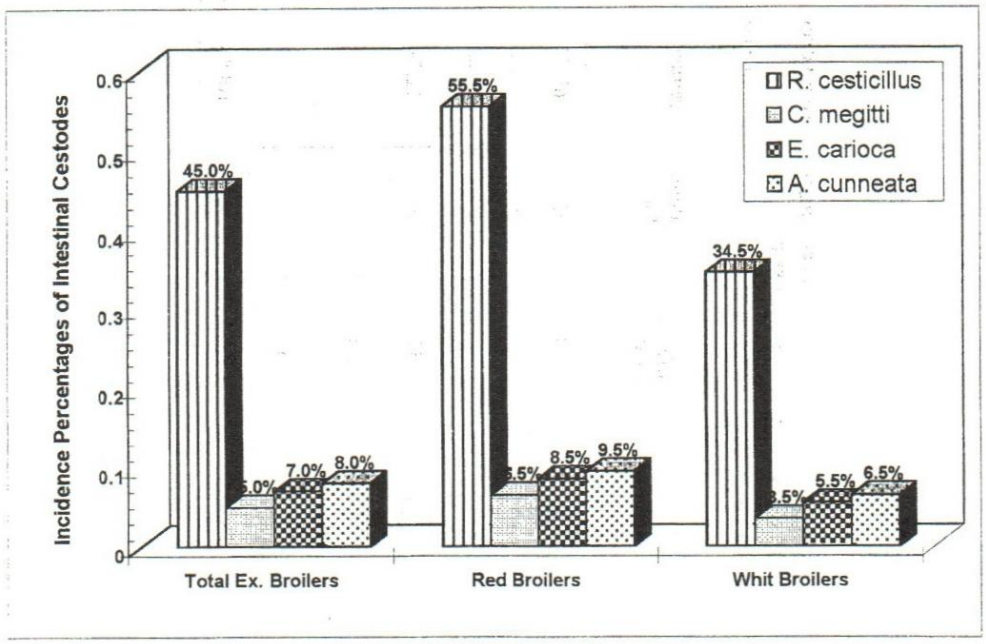
Table(2): Statistical incidence percentages of the parasitic intestinal cestodes encountered in the examined commercial broiler chickens under environmental conditions of Upper Egypt.

Poultry parasitic cestodes	Total No. of infested birds with cestodes		Type and sex of infested broiler chickens				Worm burden per host
			Red broilers		White broilers		
	No.	%	Male	Female	Male	Female	
R. cesticillus	180	69. 23	61	50	42	27	8-12
C. megitti	20	7. 69	6	7	7	0.0	2-6
E. carioca	28	10.77	9	8	7	4	60-80
A. cunneata	32	12. 31	12	7	13	0.0	120-180
Total No. of Infested Fowls	260	65	88	72	69	31	
			160 (80%)		100(50%)		
Total No. of Examined Fowls	400		200		200		

- Total No. of examined commercial broiler chickens = 400
- No. of examined *Gallus gallus* (red broilers of free-range system) = 200
- No. of examined *Gallus domesticus* (white broilers of built-up litter system) = 200

Table (3) : Prevalence percentages of the total examined apparently healthy and actually infested commercial broilers from poultry farms of the 2 different housing systems.

Type of Examined Commercial Broilers	No. of examined broilers	Average age/week	Ex. apparently healthy broilers		Ex. actually infested broilers	
			Number	%	Number	%
Gallus gallus (Red broilers)	200	40 - 48	99	49.5	160	80.0
Gallus domesticus (White broilers)	200	40 -46	110	55.0	100	50.0
Total No.	400					



Histogram (1): Distribution Incidence Percentages of Recovered Cestodes

Table(4): Statistical incidence percentages of recovered intestinal cestodes in examined commercial broilers that encountered from 2 different poultry housing systems.

Type of Poultry Cestodes	Total No. of Infested Broilers	Incidence %	Frequency %	Infested broilers of 2 housing systems						Worm burden per host
				Broiler Free-range System			Broiler Built-up Litter System			
				No. of Infested broilers	Incidence %	Frequency %	No. of Infested broilers	Incidence %	Frequency %	
R. cesticillus	180	45	69.23	111	55.5	69.38	69	34.5	69.00	8-12
C. megitti	20	5	7.69	13	6.5	8.13	7	3.5	7.00	2-6
E. carioca	28	7	10.77	17	8.5	10.62	11	5.5	11.00	60-80
A. cunneata	32	8	12.31	19	9.5	11.87	13	6.5	13.00	120-180
Total No. of Infected Broilers	260			160			100			
Total No. of Ex.Broilers	400			200			200			
Overall %		65%	100%		80%	100%		50%	100%	

Histopathology of the recovered cestodes :

Raillietina (skrjabinia) cesticillus:

In cut sections these parasites were found attached to the mucosa with the help of rostellum. The villi were drawn inside the scolex and rostellum, forming a cup-shaped appearance (Fig.1). Most of the adjacent villi were either naked or lined by degenerating epithelial cells. The substantia propria was infiltrated by a moderate number of lymphocytes and macropheges. Nath & pande [6] observed infiltration of a large number of neutrophils and a few eosinophils, which was not observed in the present study. The present authors suggested that the neutrophilic infiltration that observed might be due to bacterial infection.

Amoebotaenia cuneata:

The cut sections of the tapeworm were observed at different levels in the intestinal mucosa. The rostellum was protruding and penetrating the intestinal tissue (Fig.2). the intestinal villi were distorted and sloughed adjacent to the parasite. The nearby intestinal tissue shows infiltration of mononuclear cells and proliferation of lymphoid follicles. Chandra & Singh [11] observed sub acute to acute enteritis with small and large mononuclear cells in the lamina propria.

Echinolepis carioca:

Many cut pieces of *E. carioca* were seen in the lumen. At some places they penetrated deep into the mucosa (Fig.3). there was severe sloughing of the intestinal mucosa in addition to blunting and fusion of intestinal villi. The lamina propria was heavily infiltrated with macrophages, lymphocytes and histocytes. Verma [12] also described mild chronic enteritis due to *E. carioca* infestation in chicken.

Histochemistry of Echinolepis carioca:

(1) PAS Staining for polysaccharides :

The goblet cells lining the villi showed intense PAS positivity, where the columnar epithelial cells showed moderate to strong PAS – positive reaction. The intensity of PAS positivity was distinctly pronounced in the apical border. Other histological constituents of the cut wall gave a very weak reaction to PAS stain. Strong PAS positivity was noticed in the parasite section (Fig 4 and 5).

Normal histology:

The PAS positive substances decreased in the single columnar epithelial cells. While in the goblet cells there was no change in respect of PAS positivity. There was marked increase in the other histologic tunics in respect of PAS – positive substances.

Significant depletion of glycogen reserve in the swell intestine of the broilers infested with *Echinolepis carioca* was noticed whereas a very strong positivity for glycogen in the tapeworms was discernible It may be true that the worm utilize the glycogen as their food and causes depletion in the host tissue.

(2) Mercury bromophenol blue stain for protein:

Heavy concentration of protein was found in the cut sections of the parasite, the

simple columnar epithelial cells along with brush border, goblet cells and cells lining the gland of lieberkühn gave very weak positive reaction for protein, the lamina propria, muscularis mucosae and tunica muscularis gave weak positive reaction for protein, whereas submucosa and serosa showed very weak positivity for protein.

Normal histology :

A marked increase of protein in the goblet cells of the villi and the gland of lieberkuhn was recorded in the controls. The circular smooth muscle fibers also gave strong positive reaction, other histological constituents of the gut did no reveal any appreciable difference between infected and control fowls. It is possible that the continued presence of tapeworms in the gut lumen and mild tissue damage on the intestinal wall might decrease the ability of the intestinal tissue to absorb protein.

(3) Muci – haematin stain for mucin:

The goblet cells as well as striated border of columnar epithelial cells revealed weak to moderate positive reaction for the presence of mucin. Other histological constituents of the gut wall gave negative reaction for the mucin. The parasite was also negative for mucin substance (Fig 6) .

Normal histology :

No remarkable difference was recorded in the mucin content from that of infested specimens except in columnar epithelial cells, goblet cells and gland of lieberkühn.

DISCUSSION :

Tapeworms or cestodes are flattened, ribbon-shaped worms composed of numerous segments or division. Cestodes vary in size from very small to several inches in length. The head or anterior end is much smaller than the rest of the body. Since these parasites may be very small, careful examination often is necessary to find them. A portion of the intestine may be opened to assist in finding the cestodes. The symptoms caused by tapeworms vary and are not constant enough to be relied upon for diagnosis. In heavily parasitized young birds the common manifestations are stunted growth, emaciation, weakness and death. The symptoms are more severe and the death-rates are higher in young birds than in older fowls. The pathological changes observed at autopsy depend upon the kind and number of parasites present. From the standpoint of diagnosis, the lesions encountered are of far less value than the finding and identification of the causative parasites themselves [13&14].

The pathology or damage cestodes produce in poultry is controversial. In young birds, heavy infestations result in reduced efficiency and slower growth. Young birds are more severely affected than older birds. On the other hand mild infestations are seldom apparent prior to autopsy which are more or less clarified from the illustrated results in tables (1,2& 3), and this is inagreement with that stated by Goodman & Tudor [15]. From the obtained results in table(1) , it could be concluded that, there was a significant correlation between the infested broiler body weight and the intensity of the

tapeworm infestations. Moreover, the infestation percentages were increased with the decreased of body weight of examined birds.

All poultry cestodes apparently spend part of their lives in intermediate hosts, and birds become infected by eating the intermediate hosts. These hosts include snails, slugs, beetles, ants, grasshoppers, earthworms, houseflies and others. The intermediate host becomes infected by eating the eggs of cestodes that are passed in the bird feces. The life cycle of the tapeworm starts with an adult gravid female worm which is attached to the intestinal mucosa by its head (scolex) and sheds its terminal segments (proglottids), which are full of eggs (onchospheres), into the intestinal lumen and thus the droppings. The eggs are ingested by an intermediate host and penetrate the digestive tract and develop into cysticercoids, which are infectious to the avian host when the intermediate host is eaten and digested. The liberated cysticercoid then develops into an adult (male and female) in the intestinal lumen.

From the demonstrated results in tables (1&2), the recovered tapeworms in the examined infested broilers cause comparatively reduction of body weight and little harm unless the burden becomes too great and do not commonly cause severe pathology in poultry but rather live in the intestinal tract and compete with the host for the nutrients in ingested feed and in case, the bird needs to eat more than it would normally in order to maintain its metabolism [16]. Regarding the illustrated results in table (2), it was revealed that, there was no a significant correlation between the recovery of *Echinolepis carioca* and presence or absence of the other recovered cestodes in the infested specimens. Moreover, no clear relationship between the percentages of apparently healthy signs and percentages of actually infested broilers, table(3). The clinical signs of tapeworm infestation may include, general unthriftiness, a hearty appetite, rapid breathing, dry and ruffled feathers, cyanotic combs and weight loss which was mainly confronted in case of examined infested broilers from the free-range system (table 1 & 3). Tapeworm segments may be found in the droppings, but Lesions are usually absent except for the small site where the tapeworm is attached to the intestine and that is coincided with Goodman & Tudor [15] and Sainsbury [17].

From illustrated data shown in (table 4 & histogram 1), the total incidence percentage of cestodes in 400 intestinal tracts of the all examined commercial broilers was of 65%. Moreover, the incidence percentages of the recovered cestodes were higher in *Gallus gallus* red broilers 80% than *Gallus domesticus* white broiler 50%. Furthermore, the obtained results revealed that broilers reared under free-range system of housing had higher rate of cestodes infestation (80%) than the others reared under the built-up litter system (50 %). LÖliger [18] reported that the incidence of worm infestation was at least ten times higher in a well-run free-range system than in battery cages. In addition, Sainsbury [19] pointed out that the free range birds are subject to extreme conditions and their welfare may be so poor and high risk of parasites and diseases transmitted via faeces will have significant

effects that should be cut down by moving the birds to fresh ground. The continuous rearing of successive flocks of young chicks on the same litter, without changing, become very popular among poultry raisers as it need not to be cleaned out oftener than once a year, two years or even longer [19]. Furthermore, the moderately lowered infestation percentages that achieved in the examined broilers from the poultry built-up litter system (table 4 & Histogram1), and these obtained results are supported by Botts [20], as they concluded that the use of such old litter serves not only for decreasing expenses, but also to improve feed conversion, decrease the incidence of many poultry diseases and lower the mortality rate among chicks. The tapeworm infestations are more serious than round worm infestations since they are seldom entirely removed by treatment. Tapeworms commonly affecting birds, have a head or scolex bearing hooks which imbeds itself in the wall of the intestine. The parasites rob the host of nourishment; thus young growing birds are more readily harmed [15].

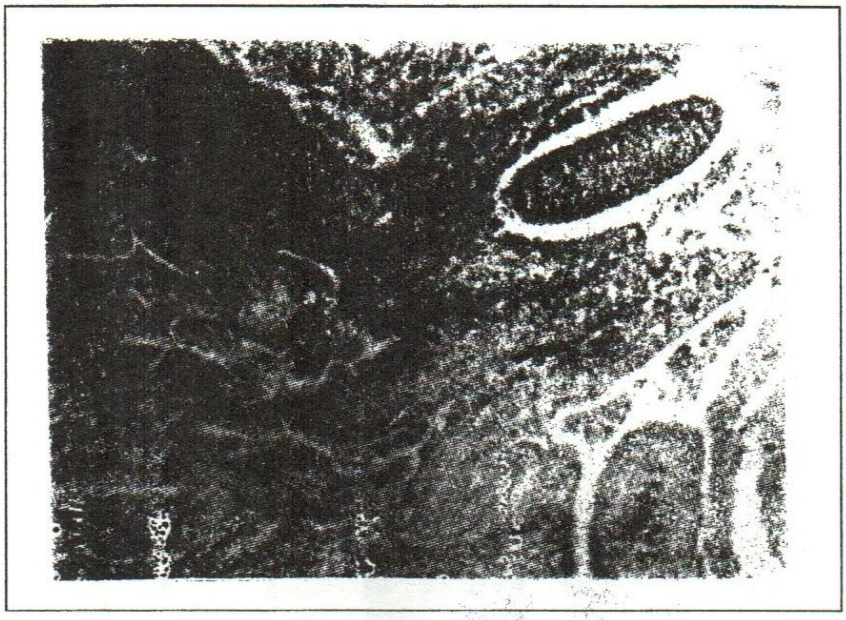
Deschiens [21] believed that, the cestode toxins might be of two types. The first type includes toxic polypeptides not identical with histamine but having a base of amines or amino acids near it, or capable of liberating or forming histamine in the organism. These apparently produce symptoms of acute histamine poisoning via inflammatory, edematous and necrotic effects on visceral organs. The second type includes allergic and anaphyactogenic proteins, glycoproteins and ploysaccharides, which are eosinophilogenic as in the present investigation on *Echinolepis carioca* , the effects attributed to both these types of toxins were observed and it might be assumed that this cestode produces both of them . A fact which if substantiated may be of great significance in case of cestode infestation in higher vertebrates including human. The concentration of parasite eggs in the broiler environment is one factor which plays a major role in determining the severity of the infestation. The chickens pick up the parasite eggs directly by ingesting contaminated feed, water, or litter or by eating snails, earthworms, or other insects (intermediate hosts) which can carry the eggs. In severe infections there can be actual intestinal blockage by the worms, causing death. Affected birds are unthrifty and more susceptible to other diseases , mainly as result of lowering of body resistance and immunity.

Prevention and control of cestode infestations in broiler flocks involve proper sanitation. Sanitation procedures of keeping litter as dry as possible and avoid overcrowding. keep wild birds, pigeons and other birds away from chickens. Provide adequate drainage of ranges and move shelters frequently to decrease accumulation of droppings. Use suitable insecticides to control insect populations. The treatment of chickens to control intestinal parasites can benefit the grower by decreasing parasite levels in heavily infested birds. This will result in a decrease in the built-up of parasite eggs in the environment. Generally ,the tapeworm life cycle can be completely disrupted by eliminating the intermediate hosts from the environment. Regular monitoring for parasitic diseases of poultry should be undertaken. Tapeworm infestation can be controlled by preventing the birds from eating the infected intermediate host using

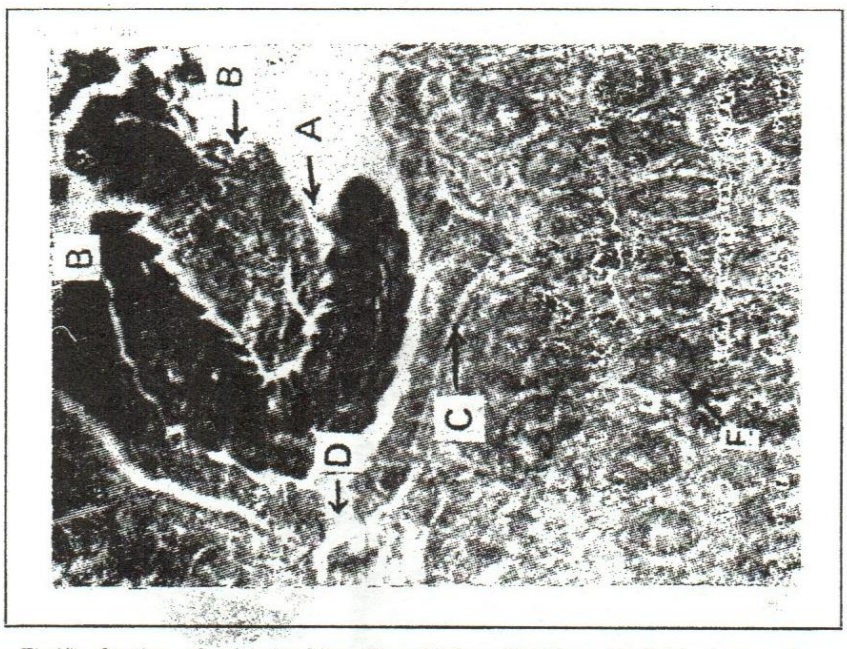
proper hygienic measures . In general the successful control of most parasitic diseases of poultry depends mainly on strict adherence to the principles of hygiene and sanitation and finally good management of the poultry flocks.

Fig(1): Section of the intestine of the examined chicken broiler infested with *Raillietina (skrjabinia) cesticillus* showing the villi drawn inside the scolex and the rostellum forming a cup-shaped appearance. H&E x 120.

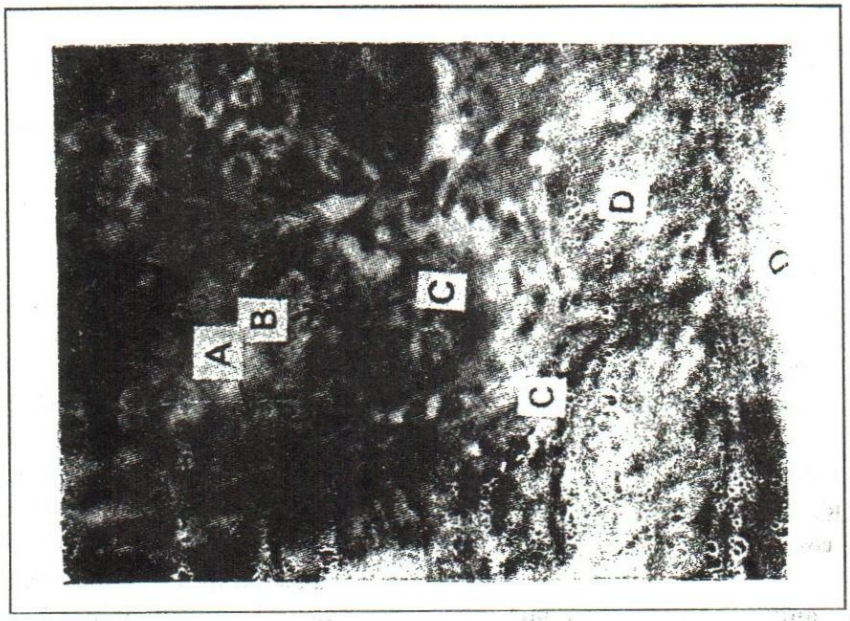
Fig(2):Section of examined broiler intestine infested with *Amoebotaenia cuneata* showing cut section of the worm embedded in the intestinal mucosa and rostellum of the parasite protruding and penetrating the tissue. H&E x 100.



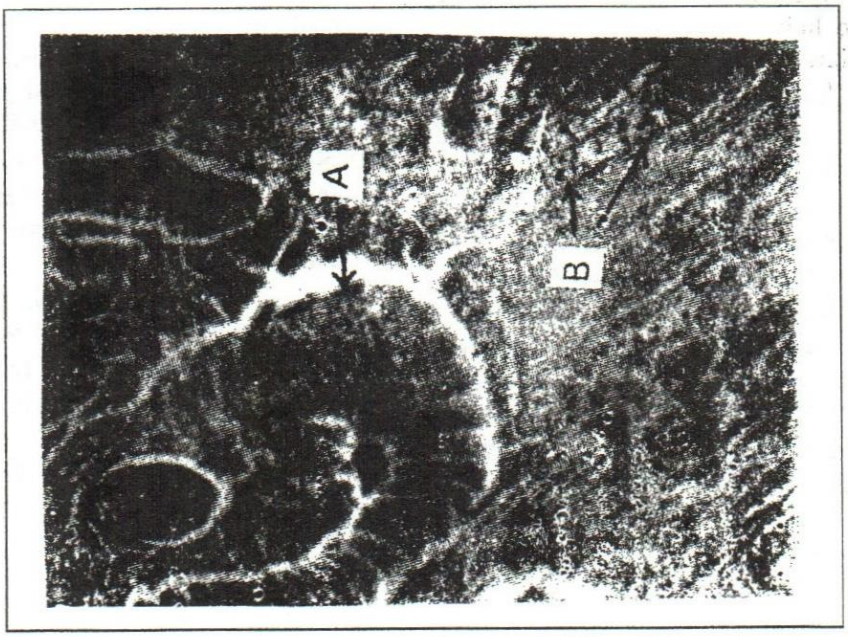
Fig(3): Section of examined broiler intestine infested with *Echinolepis carioca* showing cross-section of several pieces of the cestode penetrating deep in the intestinal mucosa. H&E. x 100.



Fig(4): Section of examined intestine of infested broiler with *Echinolepis carioca* depicting strong PAS positivity in the section of the worm (A) inside the lumen of the gut wall. Note the distorted villi (B) along with moderate strong PAS positivity in the goblet cells (C), columnar epithelial cells (D) and glands of lieberkuhn (E). PAS x 120.



Fig(5): Section of intestine of examined broiler infested with *Echinolepis carioca* depicting PAS positivity in the goblet cells (A), columnar epithelial cells (B) lining the glands of lieberkuhn (C) and muscularis (D). PAS x 480.



Fig(6): Section of intestine of examined broiler infested with *Echinolepis carioca* depicting (A) negative reaction for mucin in the parasite section (B) in contrast to weak to moderate positive section in the cells lining the villi, muci-haematin. x 120.

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Ass. Univ. Bull. Environ. Res. Vol. 3 No. 2, October 2000

دراسة إرشادية عن المضاعفات الصحية والهستوباثولوجيه الناجمة عن مدى إصابة قطعان بدارى التسمين ببعض الديدان الشريطية المعوية (الستودا) تحت ظروف التسكين المختلفة مع الإشارة لدراسة هستوباثولوجيه وهستوكيميائيه لدوده الإكينوليبس كاريوكا

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أجرى هذا البحث للوقوف على الحالة الصحية والهستوباثولوجية أثناء إجراء دراسة عن الإصابة ببعض الديدان الشريطية المعوية (الستودا) ومدى فاعلية دورها فى إحداث مضاعفات صحية واقتصادية متباينة فى بعض مزارع قطعان بدارى دجاج التسمين بالوجه القبلى، وذلك بإجراء فحوص إكلينيكية ومجهرية لإجمالى عدد ٤٠٠ من دجاج بدارى التسمين فى سن التسويق والمأخوذة عشوائيا من تلك المزارع المختلفة (عدد ٢٠٠ بدارى دجاج أحمر من مزارع ذات نظام التسكين الطليقة + عدد ٢٠٠ من نوع بدارى الدجاج الأبيض أخذت عشوائيا من مزارع مختلفة ذات نظام تسكين الفرشه العميقة) . وقد شملت هذه الدراسة كل من تقدير أوزان الطيور المفحوصة ، التقييم الظاهرى لحالة الطيور من حيث الصحة أو المرض ومدى وجود أعراض الإصابة من عدمه لديدان الرأس الشوكية (الديدان الشريطية) هذا بالإضافة لإجراء فحوص هستوباثولوجية وهستوكيميائية للوقوف والتأكد من معرفة مدى تأثير الإصابة بهذه الديدان على أنسجة أمعاء الطيور المصابة بها ، وذلك بالاستعانة بالفحص الميكروسكوبى لشرائح عينات مأخوذة من أمعاء الطيور المختبرة وذلك بعد التجهيز وعمل الصباغة لها ، وأيضا فحص شرائح لقطاعات مختلفة أخذت من بعض ديدان الستودا ، والتى تم الحصول عليها من نفس بدارى الدجاج المصاب بها ، وعلى الأخص دوده الإكينوليبس كاريوكا .

وقد أسفرت نتائج الفحوص عن وجود معدلات إصابة متباينة من الديدان الشريطية المعوية والمغنية بالدراسة فى هذا البحث تمثلت فى نسبه إصابة كليه لهذه الديدان بمقدار ٦٥٪ لإجمالى الطيور المفحوصة ، بينما تراوحت هذه النسب بمقدار ٨٠٪ فى بدارى الدجاج الأحمر والمأخوذة من مزارع ذات نظام التسكين الطليقة ، وكذلك بمقدار ٥٠٪ فى بدارى الدجاج الأبيض والمأخوذة من مزارع ذات نظام تسكين الفرشه العميقة والتى من شأنها وجوب التنويه لتعضيد الأهمية بأفضليه استخدام نظام تسكين الفرشه العميقة عنة فى حاله نظم التسكين الطليقة نظرا لما أوضحته نتائج هذا البحث من أهميه

هذا النظام فى التقليل أو خفض نسب الإصابة بالديدان المختلفة. كما أمكن الكشف عن الإصابة لإجمالى الطيور تحت الدراسة ببعض الديدان الشريطية المعوية (الستودا) ، والتى تراوحت بنسب إصابة :

Raillietina (skrjabinia) cesticillus **(69.23%),** ***Cotugnia megitti*** **(7.69%),** ***Echinolepis carioca*** **(10.77%) and** ***Amoebotenia cunneata*** **(12.31%) .**

وقد أظهرت نتائج هذا البحث أيضا عن وجود علاقه ارتباط عكسيه بين النقص في أوزان الطيور وزيادة معدلات نسب الإصابة بالديدان الشريطية المختبرة ، هذا بالإضافة إلى عدم وجود ثم علاقة ارتباط إيجابية عن مدى تواجد الإصابة بديدان الإكينوليبس كاريوكا من عدمه ، وذلك فى حالة الإصابة ببعض أنواع الديدان الشريطية الأخرى سالفة الذكر.

وتعتبر الدواجن المصابة بمثل هذه الديدان الشريطية المعوية ذات دور فعال فى انتشار والإكثار منها فى بدارى الدجاج والبيئة المحيطة ، وبما له من مردود ضار على صحة الدواجن وزيادة فرصه التعرض للإصابة بالأمراض الأخرى المختلفة نظرا لانخفاض المناعة فى القطعان المصابة وانعكاس ذلك على إنتاجيه المزارع الداجنة .

ومن الجدير بالذكر أنه قد تم استعراض بعض التوصيات والإرشادات الصحية ، والتى من شأنها التخلص أو التقليل من الإصابة بالديدان الشريطية المعوية (الستودا) فى بيئة مزارع الدواجن أملا فى الوصول للمستوى الصحى الأفضل والنهوض بالثروة الداجنة بالبلاد.