

EFFECT OF *ASCARIDIA GALLI* INFESTATION ON BODY WEIGHT, VITAMIN A AND SOME BLOOD CONSTITUENTS IN CHICKEN

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SUMMARY

The present investigation was planned to study the effect of *Ascaridia galli* infestation on the average body weight, carotenoids, vitamin A, calcium, inorganic phosphorus, sodium, potassium and magnesium of eighty chickens at 7, 14, 28 and 49 days postinfestation during the tissue and intestinal phases of the parasite.

The results indicated the following findings:

1. The maximal average live body weight was observed in case of non-infested control chickens. Severe retardation of growth of infested chicken was noticed after 49 days postinfestation during the intestinal phase of the parasite.
2. The levels of serum carotenoids, serum vitamin A, liver carotenoids and liver vitamin A of infested chicken after 28 and 49 days postinfestation during the intestinal phase of the parasite recorded a significant decrease than control ones.
3. There is a significant lowering in serum calcium, sodium and potassium levels of infested chicken after 28 and 49 days postinfestation, however, inorganic phosphorus and magnesium levels showed a significant increase above respective control.

INTRODUCTION

Tugwell and Ackert (1952) found that the first moult occurred within the egg and the infective 2nd stage larvae developed in 9-12 days at 80-90°F, when those eggs were fed to chicken, the second and third moults occurred at 6-9 and 15

days after infestation respectively. Twenty days postinfestation, fourth stage male and female larvae could be morphologically differentiated. The 4th moult took place at 25-28 days postinfestation and the worms became mature at 38-41 days.

Awadalla (1988) studied the histopathology of the different parts of the small intestine of the infested chickens and found that most of the changes occurred in the mucosa and submucosal layer of duodenum, jejunum and ileum 15, 25 and 55 days post-infestation showing a line of larval migration, desquamation of mucosal epithelium, glandular necrosis, goblet cell formation and eosinophilia.

Ikeme (1971 a&b) found that experimentally infected fowls developed diarrhoea, haemoconcentration, intestinal lesions which were most severe in birds given poor diet and were heavily infested with *Ascaridia galli* which might produce intestinal obstruction. He noticed that continued ingestion of *Ascaridia galli* eggs affected growth rate of chicken, but when the amount of protein in feed was increased, a significant variation in body weight between infected groups was demonstrated.

Wetzel et al. (1958) found that infection with *Ascaridia galli* caused a marked fall in vitamin A level in the liver in comparison with parasite-free chicken.

Leukskaya (1964) noticed that severe infection with *Ascaridia galli* caused reduction in the concentration of vitamin A in the liver. He also

found that vitamin A content of the liver of chicken aged six weeks or four months fall to 55µg/g of tissue compared with 185µg/g in non infected controls.

Haiba and Geneidy (1965) studied the effect of ascaridiasis on mineral levels in serum of Egyptian chicken. They showed that the function and permeability of the intestinal wall were affected by the size of the *Ascaridia galli* infections, also in five weeks old chickens induced a drop in serum calcium and a rise in inorganic phosphorus and magnesium. They believed that poultry rickets was commonly associated with *Ascaridia galli* infestation.

Therefore, the present investigation was undertaken to evaluate the effect of *Ascaridia galli* infestation on body weight, carotenoids, vitamin A, calcium, inorganic phosphorus, sodium, potassium and magnesium in chicken.

MATERIALS AND METHODS

Table (1): Chemical analysis and composition of starter and finisher ration

Ration ingredients	Starter	Finisher
Yellow corn	65%	74.29%
Soya bean cake -44 %	24%	18.50%
Meat meal - 60 %	8%	5%
Wheat bran	1.37%	--
Calcium carbonate	0.53%	0.60%
Dicalcium phosphate	0.37%	0.95%
Vitamin and minerals primx	0.3%	0.3%
Sodium chloride	0.3%	0.3%
DL-methionin	0.13%	0.06%
Crude protein	21.3%	17.7%
Crude fat	3.2%	3.3%
Crude fiber	0.4%	2.9%
Metabolizable energie	2932Kcal/kg	3036 Kcal/kg.

Eighty one-day old Hubbard chicks were used for this study. They were examined to be free from external and internal parasites. The birds were raised in wire-floored cages and kept under hygienic condition. The chicks were fed on starter ration (Table 1) for 28 days, then the starter ration

was replaced by the finisher ration (Table 1) to the end of the experiment (49 days). The birds were divided into two experimental groups of 20 chicks each. Group 1 was kept as non-infested control. Group 2 was orally infested with 200 embryonated eggs of *Ascaridia galli* with the stomach tube to assure direct inoculation of the infective stage of the parasite into the crop.

The chickens were individually weighed weekly and this was carried out early in the morning before offering the daily ration.

Ten chickens, from each of the two experimental groups were slaughtered at 7, 14, 28 and 49 days postinfestation to collect serum and liver samples for chemical analysis. Serum and liver vitamin A and carotenoids were determined according to the method described by Carr & Price (1926) with some modification as cited in Varley et al. (1976). Serum calcium was estimated according to the method adopted by Lorentz (1982), serum inorganic phosphorus was determined according to the method of Garher and Miller (1983). Sodium and potassium were determined according to the method adopted by Burriel and Ramirez (1957). Magnesium was estimated according to the method of Neill and Neely (1956).

RESULTS

The results displayed in table (2) revealed that there was no statistically significant difference in the average live body weight of infested chickens with *Ascaridia galli* after 7, 14 and 28 days

Table (2): Effect of *Ascaridia galli* infestation on average body weight in gramms of chickens.

Days postinfestation	Average body weight in gramms	
	Control	infested
7	91.20±1.70	90.63±2.1
14	171.50±2.30	170.10±5.05
28	581.33±5.40	570.08±7.13
49	1900.00±13.11	1210.11*±20.23

± Standard error.
* Significantly different from control values (P<0.01).

Table (3): Effect of *Ascaridia galli* infestation on carotenoids ($\mu\text{g/dl}$) and vitamin A in serum (IU/dl) and liver (IU/g) of chicken.

Parameters	Days postinfestation							
	7		14		28		49	
	Control	Infested	Control	Infested	Control	Infested	Control	Infested
Carotenoids	7.21 ± 0.18	7.00 ± 0.11	6.93 ± 0.20	6.60 ± 0.16	7.11 ± 0.13	6.49* ± 0.17	7.25 ± 0.09	5.11** ± 0.10
Vitamin A	79.90 ± 1.95	78.81 ± 2.1	79.10 ± 1.70	79.20 ± 1.0	80.10 ± 0.19	79.10* ± 0.25	80.20 ± 0.13	75.00** ± 0.11
Carotenoids	18.13 ± 0.33	18.11 ± 0.20	18.10 ± 0.21	18.11 ± 0.23	18.91 ± 0.30	18.00* ± 0.12	19.00 ± 0.11	16.20** ± 0.10
Vitamin A	219.71 ± 5.14	219.00 ± 4.10	218.11 ± 3.12	218.18 ± 3.18	218.91 ± 4.39	198.70* ± 4.99	218.10 ± 4.19	92.22** ± 6.10

± Standard error.

* Significantly different from control

values ($P < 0.05$).

** Significantly different from control

values ($P < 0.01$).

Table (4): Effect of *Ascaridia galli* infestation on serum calcium (mg %), inorganic Phosphorus (mg %), Sodium (ml Eq/L), Potassium (ml Eq/L) and Magnesium (mg %) of chicken.

Parameters	Days postinfestation							
	7		14		28		49	
	Control	Infested	Control	Infested	Control	Infested	Control	Infested
Calcium	18.94 ± 1.10	18.45 ± 1.13	19.01 ± 0.60	18.00 ± 0.90	19.44 ± 0.50	16.00* ± 1.00	20.20 ± 0.83	15.80* ± 1.20
Inorganic phosphorus	5.01 ± 0.18	4.97 ± 0.19	5.70 ± 0.16	5.50 ± 0.16	6.13 ± 0.17	6.86* ± 0.18	6.10 ± 0.23	7.25* ± 0.27
Sodium	145.92 ± 2.10	149.11 ± 2.90	146.00 ± 3.10	140.10 ± 2.90	144.81 ± 3.30	132.90* ± 3.10	145.35 ± 2.12	133.60* ± 3.30
Potassium	5.00 ± 0.15	4.90 ± 0.60	6.19 ± 0.44	5.90 ± 0.60	4.80 ± 0.66	2.95* ± 0.08	5.50 ± 0.11	4.80* ± 0.20
Magnesium	2.40 ± 0.16	2.39 ± 0.15	2.50 ± 0.16	2.43 ± 0.90	2.51 ± 0.07	2.85* ± 0.10	2.49 ± 0.09	2.96* ± 0.13

± Standard error.

* Significantly different from control values ($P < 0.05$).

postinfestation as compared with their respective control. On the opposite side the body weight of infested chicken after 49 days postinfestation was significantly decreased during the intestinal phase than control ones.

Table (3) showed that there was no significant variation in the level of serum carotenoids, serum vitamin A, liver carotenoids and liver vitamin A of infested chicken with 300 embryonated eggs of *Ascaridia galli* after 7 and 14 days during the tissue phase while such values were significantly decreased after 28 and 49 days postinfestation during the intestinal phase of the parasite.

The data presented in table (4) revealed that there was no significant differences in the level of serum calcium, inorganic phosphorus, sodium, potassium and magnesium of infested chickens after 7 and 14 days postinfestation during the tissue phase of the parasite. It showed significant lowering in calcium, sodium and potassium levels after 28 and 49 days postinfestation during the intestinal phase in comparison with respective control. On the opposite side the serum levels of inorganic phosphorus and magnesium of infested chicken after 28 and 49 days postinfestation were significantly higher during the intestinal phase than that of respective control.

DISCUSSION

The present study indicates that infestation with 300 embryonated eggs of *Ascaridia galli* decrease significantly the average live body weight of infested chickens after 49 days postinfestation (during the intestinal phase of the parasite), in comparison with the respective control. Such drop in body weight might be attributed to the destruction of the intestinal mucosa and glandular necrosis of the submucosa induced by the migration of larvae during the tissue phase and the presence of *Ascaridia galli* during the intestinal phase (Awadalla 1988). Such damage causes disturbances and interfere in the absorption and metabolic processes of nutrients through the intestinal wall. These results were in agreement with that obtained by Ikeme (1971 a & b) and Barakat (1987).

Concerning the effect of different phases of life cycle of *Ascaridia galli* infestation on serum carotenoids, serum vitamin A, liver carotenoids and liver vitamin A in chicken, the results show clearly that the levels of carotenoids and vitamin A in both serum and liver were significantly decreased in infested chickens after 28 and 49 days postinfestation which represents intestinal phase of the parasite. These results could be also attributed to the damage of intestinal wall resulting in decreased absorption of carotenoids and vitamin A. These results are in full agreement with those of Wetzel et al., (1957) and Leuvskaaya (1964).

Ascaridia galli infestation induced no significant differences on calcium, inorganic phosphorus, sodium, potassium and magnesium levels in serum of chicken after 7 and 14 days postinfestation (where the parasite was in tissue phase). It showed significant decrease in calcium, sodium and potassium levels after 28 and 49 days postinfestation during intestinal phase of the other hand the levels of inorganic phosphorus and magnesium of infested chickens after 28 and 49 days postinfestation showed a significant increase than respective control. These results could be attributed to the pathological catabolic processes which occur due to the seat effect of *Ascaridia galli* in the middle part of small intestine, where absorption of minerals occurs when the chicken were over one month of age. These results are in agreement with those of Haiba and Geneidy (1965) and Barakat (1987).

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