

تأثير اضافة المضاد الحيوى اوكسى تتراسيكلين  
على كمية العناصر المحتجزة فى اجسام الكتاكيت

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م . ن . مقلد ، ع . ا . جمال ، ا . ا . فلتس

بدا البحث بـ ٤٠٠ كتكوت غير موى عمر يوم وايضا ٤٠٠ كتكوت رويد ايلاند ريد ، وبذلك  
لدراسة تأثير اضافة الاوكسى تتراسيكلين فى الغذاء على ترسيب الكالسيوم والفسفور  
والحديد والمنجنيز والنحاس فى اجسام الكتاكيت عند عمر ١٢ اسبوعا . وقد اتضح  
من الدراسة ان اضافة المضاد الحيوى بمعدل ٥٠ ملليجرام لكل كجم عتيقة . قد  
ادى الى زيادة المحتجز من العناصر الخمسة زيادة معنوية كما حسن معدلات الاستفادة  
من فوسفور ومنجنيز العتيقة .

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DIETARY OXYTETRACYCLINE AND ITS EFFECT  
ON MINERAL RETENTION IN CHICKEN ORGANISM  
(With Four tables)

By

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SUMMARY

The experiment was started with four hundreds of one-day Fayoumi chicks and equal number of Rhode Island Red to study the effect of oxytetracycline supplementation on the mineral retention of calcium, phosphorus, iron, manganese and copper in chickens organism at 12 weeks of age. It was detected that the dietary antibiotic (50 mg/kg ration) significantly increased the retention of the mentioned five minerals, and also improved the utilization of both phosphorus and manganese.

INTRODUCTION

It has been proved that the introduction of species antibiotics to the ration of growing animals had led to improvement in the absorption and utilization of some minerals (PEPPER et al., 1951 and 1952; LINDBLAND et al., 1952 VODOLOZHCHENKO, 1966; KIRCHGESSNER and GRASSMANN, 1970 and GEEVER et al., 1970). Herein, a trial for studying the effect of oxytetracycline supplementation on calcium, phosphorous, iron manganese and copper retention in the body of the growing Rhode Island Red (R.I.R.) and Fayoumi chicks.

MATERIALS AND METHODS

Four hundreds each of Fayoumi and Rhode Island Red day-old chicks were divided into equal groups (of 200 each). The first group, which was considered as control was fed basal diet presented in Table (1), while, the second one was fed

the basal diet supplemented with 50 ppm of oxytetracycline. The chicks were brooded on floor using electrical brooders under standard temperature. The brooding period extended to 8 weeks of age, thereafter, the sexes were separated and reared on floor pens under uniform conditions.

At 12 weeks of age, random sample of 6 birds from each group (3 males and 3 females) were taken, fasted for about 12 hours, weighed and then killed using ether in a closed container. The alimentary canal was emptied carefully. Thereafter each bird was thoroughly mixed with sodium hydroxide solution in a big beaker and gently heated to obtain a saponificated paste of a smooth consistency according to the method of BOJKA and OSTRIVINI, (1966). The paste was dried in an oven at 70°C, then, ground, mixed and kept in glass-stoppered containers till analysis. Three separate weights from each sample were taken for preparing ash solutions using the procedure reported by Oll (1962). Calcium was determined as its oxalate, while phosphorus was determined colorimetrically according to the method of LEBEDEF and OOSOVICH (1969). Iron and Manganese were determined after ALIKAEV *et al.* (1967) and copper was determined as described by TAOTSIN (1968).

The statistical analysis were carried according to the methods recommended by SNEDECOR and COCHRAN (1967).

#### RESULTS AND DISCUSSION

The data presented in Table (2) show that the antibiotic supplemented males of both Fayoumi and R.I.R. has higher values of calcium content than the unsupplemented ones. However, this trend was not clear in females. The analysis of variance (Table 4) showed that the differences in calcium retention due to treatment and to the interaction of treatment with sex were significant.

Calculating the calcium body content as a percentage of the calcium intake (Table 3), it was found that the treated groups had lower percentages than the untreated ones (except in the Fayoumi treated males). Since SCOTT and GLISTA (1950) could not obtain a growth response with aureomycin when the feed intake of chicks was equated with that of the controls, they suggested that increased feed consumption was induced by the antibiotic. Thus, the decrease in the calcium content of the treated groups may be attributed to a great extent to the increase in calcium intake than to the increase in its utilization, except in the Fayoumi treated males where both calcium consumption and calcium utilization were increased. In the R.I.R., the calcium consumption till 12 weeks of age was 32.6, 37.9 grams in the males and 20.8, 30.1 grams in the females of the untreated and treated groups, respectively. The corresponding values in the Fayoumi were 25.4, 30.8 and 23.0, 25.4 grams.

The antibiotic-fed chicks showed a higher content of phosphorus in their bodies than their controls (Table 2). The differences between treatments were highly significant (Table 4). This increase may be due to the improvement in the utilization of phosphorus. Similar conclusions were reported by LINDBL D et al. (1952) and VODOLAZHCENKO (1966). ANDERSON et al., (1952) and BYERLY (1964) suggested that the inclusion of antibiotics in the ration of growing animals may improve the absorption of the nutrients in the ration.

The percentage ratio of phosphorus body content to the phosphorus intake (Table 3) indicates that the treated chicks had higher percentages than the untreated ones. Although the phosphorus intake was increased in the treated groups than the untreated ones, yet, the ratio of phosphorus body content to the phosphorus intake was still higher for the

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treated groups than the untreated ones. This indicated that the oxytetracycline supplementation improved the phosphorus utilization.

Looking back at Table 2, it could be detected that the treated chicks retained more iron in their bodies than the untreated ones. In general, the treated groups had higher values of iron body content than the untreated groups. The differences between treatments were highly significant (Table 4). Comparing the treated groups with the untreated ones in their iron body content (presented as a percentage to the iron intake), it could be noticed that the percentages of the treated groups were nearly the same or slightly higher than those of the untreated ones. This means that the iron intake and iron utilization in the treated groups were equally increased so that the increase in the iron utilization could not be observed.

The oxytetracycline supplementation resulted in an increase in manganese body content (Table 2). The analysis of variance (Table 4) showed that the differences between treatments were highly significant. Thereafter, it seemed that the antibiotic supplementation enhanced also the utilization of manganese. The ratio of manganese body content to the manganese intake (Table 3), reflects the improvement in manganese utilization of the treated groups. With concern to the breed effect on manganese body content, the differences were highly significant and it was noticed that the Fayoumi chicks had higher values than the Rhode Island Reds (Table 4).

As regards the effect of dietary antibiotics on the mineral requirements, PEPPER et al., (1951) found that aureomycin lowered the manganese requirement for growth and perosis prevention. In 1952, they reported that the incidence of perosis in chicks fed low-manganese diets was reduced.

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ced by dietary aureomycin. They added that the reduction in bone ash percentage caused by adding aureomycin to the diets containing 0.41 percent inorganic phosphorus suggest that at this level of phosphorus may not be adequate for maximum calcification in the presence of aureomycin. ANDERSON et al., (1957) reported that the presence of chlortetracycline hydrochloride in poultry diets enhancing the utilization of the manganese and niacin.

Comparing the treated group of R.I.R. chicks with the untreated one, it could be noticed that the copper content in the bodies of the first group averaged 2.029 milligrams as compared with 1.956 milligrams in the latter. L.S.D. values show that the difference between treatments was insignificant. In the Fayoumi, the treated groups had higher values of copper retention than the untreated ones and the difference between treatments was highly significant.

The copper body content expressed as a percentage of copper intake in the R.I.R. treated group was lower than that in the untreated group, while the treated Fayoumi groups showed higher percentage than the untreated ones. This indicates that the oxytetracycline supplementation increased the copper utilization in the case of Fayoumi chicks, but not in the case of R.I.R. This may be due to the higher feed consumption of the treated R.I.R. chicks. A highly significant difference was proved between Fayoumi and R. I. R. (Table 4). KIRCHGESSNER and GRASSMANN (1970) found that the daily retention of copper was obviously increased in the antibiotic group, was that of cobalt and zinc. Some other trace elements (iron, aluminium, molybdenum), however, exhibited no increase. They added that the chelate forming properties of chlortetracycline are responsible for the increasing absorption of trace elements. However, RETTURA et

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al., (1973) reported that penicillin administration had led to a negative copper balance in rats.

Therefore, it can be concluded that the retention of (Ca, P, Fe, Mn, Cu), and also the utilization of phosphorus and manganese were improved by the addition of oxytetracycline to growing chick's ration until 12 weeks of age.

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Table (1): Composition of the basal diet. (1)

Ingredients	%	Ingredients	%
Ground corn	49.5	Blood meal	3.0
D. Cottonseed meal	10.0	Lime-stone	2.7
Horse beans	5.0	Sodium chloride	0.5
Wheat bran	24.0	Vitamin premix <sup>(2)</sup>	0.1
Protelane	5.0	Mineral mixture <sup>(3)</sup>	0.2
Grude protein <sup>(4)</sup>	16.5	Metabolizable energy <sup>(4)</sup> (Kcal/Kg.)	2640

(1) Each Kilogram contains 14.5g Ca; 6.3g P; 309 mg Fe; 77 mg Mn and 2.3 mg Cu.

(2) Each gram contains 5000 I.U. Vitamin A and 500 I.u. Vitamin D<sub>3</sub>.

(3) Each Kilogram contains:  
 990.151 g. sodium chloride. 199. mg. Manganese sulphate.  
 6.077 g. Ferrous sulphate. 100 mg. Zinc oxide.  
 1.980 g. Ferric sulphate. 21 mg. Sodium borate.  
 21.000 mg. Potassium iodide. 63 mg. Cobalt chloride.  
 199.000 mg. Copper oxide. 199 mg. Manganese sulphate.  
 999.000 mg. Potassium chloride.

(4) Calculated according to Anwar (1973).

Table (2); Effect of antibiotic supplementation on the mineral retention in the chickens organism at 12 weeks of age.

Mineral	Untreated				Treated			
	R.I.R.		Fayoumi		R.I.R.		Fayoumi	
	♂	♀	♂	♀	♂	♀	♂	♀
Ca(g)	3.996	4.385	4.512	3.323	4.372	4.247	5.850	3.329
P (g)	2.268	2.397	2.743	1.915	2.638	2.750	2.348	2.132
Fe(mg)	59.259	45.213	69.778	47.840	59.474	59.006	87.065	49.486
Mn(mg)	0.814	0.747	2.016	1.051	1.233	1.1855	2.495	1.537
Cu(mg)	2.376	1.537	2.626	2.182	2.706	1.352	4.959	3.789

L.S.D. Values:

	Ca	P	Fe	Mn	Cu
At 1 %	0.892	0.162	10.587	0.146	0.107
At 5 %	0.671	0.172	7.967	0.110	0.080

Table (3): Effect of antibiotic supplementation on the mineral content of chicken organism at 12 weeks of age (expressed as percentages of mineral intake).

Mineral	Untreated				Treated			
	R.I.R.		Fayoumi		R.I.R.		Fayoumi	
	♂	♀	♂	♀	♂	♀	♂	♀
Calcium	12.27	15.89	17.77	14.45	11.53	14.11	19.01	13.07
Phosphorus	12.03	19.97	24.84	19.15	15.96	21.01	25.01	19.25
Iron	7.33	6.59	11.06	8.38	6.31	7.89	11.39	7.83
Manganese	4.97	5.38	15.80	9.96	6.47	7.83	16.13	12.01
Copper	4.22	3.22	5.97	5.49	4.13	2.60	9.33	8.61

Table (4): Analysis of variance of the mineral retention of chicks at 12 weeks of age.

Source of variation	D.F.	M. S.				
		Calcium	Phosphorus	Iron	Manganese	Copper
Treatment	1	3.6580*	2.686**	1220.5**	3.737**	23.452**
Sex	1	15.1277**	3.657**	6165.5**	4.667**	20.688**
Breed	1	0.0633	0.007	1096.6**	10.956**	41.387**
Sex X Treatment	1	2.9732*	0.184	4.7	0.001	3.337*
Sex X Breed	1	15.8269**	5.871**	2278.0*	3.580**	0.010
Treatment X Breed	1	0.8881	0.013	27.2	0.014	20.591**
Treatment X Sex X Breed	1	1.2085	0.152	3011.0**	0.100	0.541
Error	64	0.5081	0.167	71.08	0.138	0.727

\* Significant at 0.05 ;

\*\* Significant at 0.01 ;