

## بيركلورات الامونيوم - كمشط للغدة الدرقية وتأثيره على النمو في الكناكيت

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### الملخص

أضيف مركب بيركلورات الامونيوم بمستويات مختلفة ( ٢٥ ، ٥٠ ، ١٠٠ ، ٢٠٠ مجم/كجم ) الى عليقة كناكيت فيومى عمر ٣ أسابيع ، واستمرت الاضافة حتى عمر ١٦ أسبوع ، وقد درست أوزان الكناكيت فى هذه الفترة ، كما تمت دراسة نسبة التصاق ونسبة الأعضاء والمضلات المختلفة لجسم الذكور عند عمرى ١٢ ، ١٦ أسبوع . وقد اتضح أن لاضافة بيركلورات الامونيوم تأثيرا مفيدا على النمو وعلى نسبة أجزاء الجسم الصالحة للأكل مثل الصدر والأرجل والفخذين . وكان أنسب معدل للاضافة هو ٢٥ مجم/كجم عليقة وظهر أثرها بوضوح عند عمر ١٦ أسبوعا .

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## AMMONIUM PERCHLORATE— A THYROSTATIC PREPARATION— IN RELATION TO CHICKENS GROWTH

(With four tables)

By

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### SUMMARY

Supplementation of ammonium perchlorate ( $\text{NH}_4 \text{ClO}_4$ ) were added at different levels (25, 50, 100, 200 and 400 mg/kg) to the ration of 3-weeks old Fayoumi chicks. The treatments were prolonged till 16 weeks of age. Body weights at different ages were studied. Besides, eviscerated weights, dressing percentages, and percentages of different muscles and organs of males at 12 and 16 weeks of age were taken into consideration.

It was found that ammonium perchlorate supplementation beneficially affected the growth of 16 weeks old chicks. It increased the percentages of the edible parts (breast, legs and thighs) in the male carcass at 16 weeks of age. Ammonium perchlorate at 25 mg/kg diet seemed to be the more suitable level of supplementation.

### INTRODUCTION

Several trials have been conducted to reduce the secretory level of the thyroid gland in an attempt to decrease the catabolic processes of the living organism and consequently to obtain an increase in the live weight (KALININ *et al.*, 1962; MOZGOV, 1964 and POPICHINA, 1961 and 1963). The use of ammonium perchlorate as a cheap and safety thyrostatic preparation, in animal and poultry feeding, have been ascertained in the Soviet Union since 1968. It has been proved by SALON *et al.*, (1972); RAGHIB (1972); AMER (1974) and TKASHEK (1974) that ammonium perchlorate can decrease the functional activity of the thyroid gland and increase the production of meat, egg and wool.

The aim of the present study is to examine the effect of ammonium perchlorate supplementation at various levels to the chickens' ration on their growth and development under Upper Egypt conditions.

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## MATERIALS AND METHODS

Three hundreds and ninety-six Fayoumi chicks of three weeks old were randomly chosen and equally divided into 6 groups. Each group (66) chicks included equal numbers of males and females. Throughout the experimental period, i.e. from 3 to 16 weeks of age; group 1 was considered as a control, and fed the basal ration presented in Table 1. Groups 2, 3, 4, 5 and 6 received beside the basal ration a supplementation of ammonium perchlorate at the levels of 25, 50, 100, 200 and 400 mg/Kg ration, respectively. Chicks were raised on a floor brooder system, and were fed *ad libitum*,

The chicks were individually weighed at the beginning of the experiment, and then weekly up to 16 weeks old. At 12 and 16 weeks of age, eight male chicks from each group were killed, bled and eviscerated. The eviscerated weight, the cut-up parts and the weights of different organs and glands were determined and calculated as percentages of the live weight.

Throughout the whole experiment, all birds were clinically healthy. Moreover, post-mortem examination of eviscerated chickens showed no abnormal macroscopic lesions.

The data obtained were subjected to statistical analysis, and comparisons between means of the live body weight at 16 weeks old were made by "t" test as outlined in *SNEDECOR* (1956).

## RESULTS AND DISCUSSION

The data presented in Table 2 show that the promotive effect of ammonium perchlorate supplementation on growth was insensible till 12 weeks of age. However, this effect became more obvious at the period from 13 to 16 weeks of age.

The averages of live body weight of the treated groups (2, 3, 4, 5 and 6) at 16 weeks of age significantly differed from the average body weight of their control group ( $P < 0.05$ ), but they did not differ significantly from each other ( $P > 0.05$ ). Therefore, it could be concluded that ammonium perchlorate was effective at the later stages of growth. No differences in body gain were achieved by increasing the level of supplementation more than 25 mg/kg ration.

It appears from Table 3 that the dressing percentage of the 12-weeks old chicks seemed to decrease with increasing level of ammonium perchlorate in the diet. At the same age, the percentages of breast and legs in groups 2, 3 and 4 were similar to those of the control group. However, an increase in the percentages of thighs was observed in groups 5 and 6. Moreover, there were gradual increases in the percentages of gizzard, intestine and thyroid of the 12-weeks old chicks being parallel with increasing the level of supplementation.

Table 1 ; The composition of the basal ration .

Ingredients	%
Corn . . . . .	50
Decorticated cottonseed meal . . . . .	15
Rice bran . . . . .	20
Wheat bran . . . . .	10
Blood meal . . . . .	2.4
Limestone . . . . .	2.0
Common salt . . . . .	0.5
Vitamin premix (A+D <sub>3</sub> )* . . . . .	0.1
Calculated values** :	
Metabolized energy, Kcal/kg . . . . .	2804
Crude protein,% . . . . .	17.25
C/P ratio . . . . .	162.5

\* Vitamin premix contained : V.A. 5000 I.U. and V. D<sub>3</sub>. 500 I.U. per gram.

\*\* Calculated values : Values were calculated according to Anwar(1973).

The age of 16 weeks may be considered as a suitable age for marketing males of our local strains. Therefore, it was noteworthy to study the carcass quality of males at this age. The data presented in Table 4 show the weights and percentages of muscles and organs of males at 16 weeks old. Comparing with the control group, there was a gradual increase in the eviscerated weight but not in the dressing percentage, with the gradual increase in the level of ammonium perchlorate. In the case of groups 2, 3 and 4, there were increases in the percentages of the edible parts such as breast, legs and thighs. However, in the case of group 5, the increase was only in the thigh percentage. It is noteworthy to mention that the relative weight of thyroid gland (mg/100 g body weight) was increased at 16 weeks old as a result of ammonium perchlorate supplementations. Increases in the intestine length in groups 3, 4 and 5 were also observed. However, no differences were detected between the different groups in the heart, gizzard, liver, spleen, pancreas, proventriculus and blood percentages.

The detected increase in the thyroid gland weight of the chicks that received ammonium perchlorate may be explained on the basis that ammonium perchlorate as a thyrostatic preparation inhibit or decrease the utilization

TABLE 2. Means of live body weight of the different experimental groups at the different ages (in grams)

Age (in weeks)	Groups											
	1 (control)		2 (25 mg)		3 (50 mg)		4 (100 mg)		5 (200 mg)		6 (400 mg)	
	n	Wt.	n	Wt.	n	Wt.	n	Wt.	n	Wt.	n	Wt.
3	66	77.7	66	86.5	66	81.1	66	84.2	66	81.9	66	78.6
4	59	100.2	61	127.0	62	121.2	63	120.5	59	115.5	64	110.1
5	59	134.7	60	164.8	61	160.5	63	155.3	57	157.4	61	152.6
6	58	156.2	59	214.0	58	194.5	60	188.3	54	189.6	60	181.2
7	56	199.3	56	260.0	58	244.1	60	235.5	50	225.2	60	222.9
8	55	251.1	55	313.2	56	288.3	57	270.5	49	259.9	58	248.1
9	53	305.0	55	336.3	56	322.8	53	323.8	48	320.0	57	314.9
10	53	378.9	53	416.9	56	401.4	52	404.1	47	364.1	55	371.3
11	51	426.8	52	457.5	56	450.4	51	433.3	45	412.6	54	397.1
12	50	482.8	52	541.3	56	518.2	51	504.5	45	494.1	54	470.9
13	42	524.0	44	639.2	48	633.2	43	625.8	37	605.2	46	596.0
14	42	575.7	44	696.4	48	688.2	43	682.1	37	657.2	46	638.4
15	42	625.9	44	756.6	48	742.6	43	745.4	36	718.9	46	697.9
16	41	686.3 ±	44	843.4 ±	48	837.3 ±	42	829.9 ±	35	787.3 ±	45	788.8 ±
		31.3		41.1		39.7		45.1		31.8		28.3

TABLE 3. weights of the different organs and muscles of males and their percentages to live body weight at 12 weeks of age.

Criterion	Groups											
	1 (control)		2		3		4		5		6	
	Absolute	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%
Live body weight (g) . . . . .	539	—	545.6	—	559.8	—	520.9	—	514.9	—	51.6	—
Eviscerated weight (g) . . . . .	389.5	—	389.2	—	392.6	—	357.3	—	334.5	—	42.0	—
Dressing percentage . . . . .	—	72.3	—	71.3	—	70.1	—	68.6	—	65.0	—	—
<i>Cut-up parts :</i>												
Breast (g) . . . . .	58.3	15.0	57.2	14.7	57.2	14.6	55.6	15.6	51.6	15.6	15.4	—
Legs (g) . . . . .	53.7	13.8	52.6	13.5	50.6	12.9	45.5	12.7	42.0	12.7	12.6	—
Thighs (g) . . . . .	54.3	13.9	56.6	14.5	54.8	14.0	54.8	15.3	53.5	16.0	16.0	—
Heart (g) . . . . .	3.9	1.0	4.6	0.9	3.4	0.9	3.3	0.9	3.3	0.9	1.0	—
Gizzard (g) . . . . .	17.0	4.4	23.8	6.4	22.0	5.6	22.5	6.3	22.8	6.8	6.8	—
Liver + Bile (g) . . . . .	19.2	4.9	17.0	4.6	16.6	4.3	17.0	4.8	14.9	4.5	4.5	—
Spleen (g) . . . . .	1.4	0.4	1.8	0.5	1.7	0.4	1.9	0.5	1.2	0.5	0.7	—
Pancreas (g) . . . . .	1.6	0.4	2.0	0.5	2.6	0.7	2.4	0.6	2.4	0.6	0.7	—
Proventriculus(g) . . . . .	2.9	0.7	2.8	0.8	3.2	0.8	2.9	0.8	2.7	0.8	0.8	—
Intestines (g) . . . . .	30.4	5.6	30.2	5.5	35.2	9.0	27.9	7.8	31.8	7.8	9.5	—
Intestines (cm) . . . . .	124.0	—	122.4	—	132.4	—	122.0	—	128.1	—	—	—
Paired thyroid (mg) . . . . .	35.4	—	42.8	—	42.6	—	49.1	—	44.0	—	—	—
Paired thyroid (mg/100 g B.W.) . . . . .	6.6	—	7.8	—	7.6	—	8.4	—	8.6	—	—	—
Blood loss (g) . . . . .	18.2	3.4	30.4	5.6	26.0	4.8	21.8	4.2	22.3	4.2	4.3	—

TABLE 4. Weights of the different organs and muscles of males and their percentages to live body weight at 16 weeks of age.

Criterion	Groups											
	1 (control)		2		3		4		5		6	
	Absolute	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%
Live body weight (g) . . . . .	704.0	—	901.5	—	957.0	—	1024	—	1024	—	1075.4	—
Eviscerated weight (g) . . . . .	502.9	—	646.4	—	691.4	—	715.9	—	731	—	762.1	—
Dressing percentage . . . . .	—	71.4	—	71.7	—	72.3	—	69.9	—	71.4	—	70.9
<i>Cut-up parts :</i>												
Breast (g) . . . . .	85.2	17.0	120.4	18.6	116.6	16.9	148.4	20.7	121.0	16.6	134.4	17.6
Legs (g) . . . . .	66.6	13.2	95.2	14.7	99.2	14.4	111.6	15.6	99.4	13.6	95.6	12.5
Thighs (g) . . . . .	73.2	14.6	100.6	15.6	106.0	15.3	117.0	16.3	121.0	16.6	108.2	14.2
Heart (g) . . . . .	4.5	0.9	5.2	0.8	4.8	0.7	6.1	0.9	4.5	0.6	5.7	0.8
Gizzard (g) . . . . .	25.0	5.0	27.6	4.3	31.6	4.6	31.4	4.4	37.0	5.1	31.2	4.1
Liver + Bile (g) . . . . .	23.6	4.7	27.0	4.2	26.8	3.9	27.6	3.9	33.2	4.5	24.2	3.2
Spleen (g) . . . . .	1.9	0.4	2.9	0.5	1.6	0.2	1.9	0.3	3.0	0.4	1.6	0.2
Pancreas (g) . . . . .	2.1	0.4	2.7	0.4	2.1	0.3	2.8	0.4	2.2	0.3	2.7	0.4
Proventriculus (g) . . . . .	3.1	0.6	2.8	0.4	2.9	0.4	3.5	0.5	2.8	0.4	3.0	0.4
Intestines (cm) . . . . .	32.0	6.4	31.6	4.9	42.0	6.1	44.0	6.2	50.8	7.0	36.2	4.8
Paired thyroid (mg) . . . . .	124.2	—	123.4	—	139.0	—	141.2	—	138.0	—	135.0	—
Paired thyroid (mg/100 g B.W.) . . . . .	124.0	—	188.0	—	265.0	—	278.0	—	181.0	—	312.0	—
Blood loss (g) . . . . .	12.1	—	20.9	—	27.7	—	27.1	—	25.7	—	29.3	—
	32.0	4.6	40.6	4.5	39.2	4.1	42.2	4.1	32.0	3.1	48.6	4.5



of iodine by the thyroid gland. RAGHIB, (1972); SALON *et al.* (1972) and AMER (1974), found a decrease in the total, inorganic and protein-bound iodine in serum of chickens, cattle and sheep fed ammonium perchlorate. Therefore, the pituitary, in response to the hypofunction of thyroid gland, starts to increase its production of thyrotrophic hormones which leads to hypertrophy and hyperplasia of the epithelia lining of the thyroidal acini. This hypothesis is in agreement with the findings of JUKOVA (1958) by using merkazolyl.

The hypofunction of thyroid gland is accompanied by a slower passage of food through the gastro-intestinal tract which leads to better digestion and absorption (RAGHIB, 1972). Besides, it causes a mild decrease in the catabolic processes and consequently improves the live body weight. Dressing value and meat quality, as reported by STEPANOV (1967), were improved in cases of extirpation of the thyroid gland.

The promotive effect of ammonium perchlorate on growth confirmed here is in harmony with the results of RAZOMOVSKI (1971) in calves; RAGHIB (1972) in hens and AMER (1974) in rams.

Finally, we may come to the following conclusion:

The ammonium perchlorate supplementation may affect on body weight, eviscerated weight and also on the percentages of the edible parts (breast, thighs, legs) of Fayoumi male chicks at 16 weeks of age. It can also be concluded that the suitable level of supplementation is 25 mg ammonium perchlorate per Kg. diet.

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The undersigned hereby certifies that the above-named person is a member of the [Organization Name] and that the information furnished is true and correct to the best of his knowledge and belief.

Witness my hand and seal this [Date] day of [Month], 19[Year].

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