# بعض الدراسات على تأثير اضافة الأمونيوم بيركلورات والكاتوزال على عليقة الكتاكيت الفيومى

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## الملخص

قام الباحثون باضافة مادة الامونيوم بيركلورات ( كمثبط لنشاط الغدة الدرقية ) وكذلك الكاتوزال ( مركب فوسفور عضوى مع فيتامين ب ١٢ ) الى العليقة الأساسية لـ ٥٩٦ كتكوت فيومى عمر يوم واستمرت هذه الاضافة حتى عمر ١٦ أسبوع وقد لاحظ الباحثون ما يلى :

١ ـ حدثت زيادة معنوية فى الوزن الحى للطائر وكذلك وزن الخصيتين وعدد الحيوانات المنوية فى الجرام واحد من الخصية وكذا المجموع الكلى للحيوانات المنوية فى الخصية فى الكتاكيت التى أعطيت مركب الأمونيوم بيركلورات بنسبة ٢٥ ، ٥٠ ، ١٠٠ ، ٢٠٠ ، ٤٠٠ مجم لكل كيلو جرام عليقة وكذلك المجموعات التى أعطيت الكاتوزال بنسبة ٣ سم٣ لكل لتر ماء شرب .

٢ ـ أن التغيرات التى حدثت فى بعض مكونات الدم لبعض المجموعات التى أعطيت المركبات السابقة لم يكن لها أى تأثير جانبى على حالة الطيور الصحية .

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# SOME STUDIES ON AMMONIUM PERCHLORATE AND CATOSAL AS ADDITIVES TO FAYOUMI COCKERELS RATION

(With 3 tables)

*By*

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(Received at 14/5/75)

## SUMMARY

Ammonium perchlorate (thyroid depressant) and catosal (organic phosphorus preparation mixed with vitamin $B_{12}$ Bayer Co.) were added to the basal ration of 596 one-day-old Fayoumi chicks till the age of 16 weeks. A significant increase was observed in the live body weight, paired testes weight, sperm per gramme tissue and total sperm per testes in groups receiving ammonium perchlorate at levels 25, 50, 100, 200 and 400 mg per kg ration and Catosal at alevel of 3 ml per litre drinking water for 16 weeks. Variations in the level of blood serum urea non-protein nitrogen and total cholesterol of certain groups did not have any deleterious effect on the health of such growing chicks when both compounds were added.

## INTRODUCTION

Although much information about reproduction in poultry appeared in the literature (Crew, 1925; Munro, 1938; Grigg and Hodge, 1949; Parker, 1962; Lake, 1971 and Tingari, 1973) little is known about the effect of certain feed microadditives upon the reproductive performance of growing cockerels. In 1959, Turner reviewed that thiouracil and thyroidectomy induced hypothyroidism with consequent regressive changes in testicular size and spermatogenesis in cockerels. Moreover, Titus and Burrows (1949); Martinez-Campos (1947) and Kumaran and Turner (1949) reported that when thyroprotein, desected thyroid and iodine were administered in suitable doses to cockerels a slight improvement in their fertility was observed together with the other symptoms of hyperthyroidism.

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favourable increase in the gonadal and extragonadal sperm reserves of growing Dokki-4 cockerels, when the ration of these birds was supplemented with manganese, zinc, copper and iodine. The use of ammonium perchlorate as (thyroid depresesant) (Rageb, 1972) and Catosal as organic phosphorus preparation mixed with vitamin $B_{12}$, Bayer (El-Amrousi, El-Hammady, Makled & Amer, 1975) in veterinary practice during the last few years, raised our interest to study our local Fayoumi cockerels.

Moreover, the blood serum urea, non-protein nitrogen and total cholesterol were chemically determined to find out the effect of both additives on these of cockerels.

## MATERIAL AND METHODS.

In the present study a total number of 596 one-day-old Fayoumi chicks were used. Out of these chicks, 396 were selected at random and divided into 6 equal groups: one served as control and to the basal ration of the rest of the groups ammonium perchlorate at a levels of 25, 50, 100,200and 400 mg per kg ration respectively were added. The remaining 200 chicks were classified into 2 equal groups, 2 and 3 ml Catosal per liter of their drinking water were respectively added.

The composition of the basal ration of these birds was given in Table 1

At 12 and 16 weeks of age, 8 and 5 cockerels were chosen respectively at random from each group and slaughtered. After evisceration, the paired testes were weighed and their sperm reserves were counted according to Osman (1972)

Blood samples were taken from each cockerels at the time of slaughtering. After clotting and centrifugation, the clear sera were examined for urea and non - protein nitrogen applying the methods cited by Raitska (1970). The cholesterol was determined after Ilca (1962).

The obtained data were statistically analysed. The mean standard error, t-test and simple correlation as outlined according to Snedecor (1956).

## RESULTS

From (Taable 1), it is evident that a variable number of cockerels in the treated groups showed positive testicular sperm count at 12 weeks of age before all birds in the control group. It is noteworthy to mention that at this age the differences between groups in live body weight and paired testes weight were not significant.

At 16 weeks of age (Table 3), the live body weight, the testes weight, the number of sperms per gramme tissue as well as per paired testes showed

TABLE 1. The composition of the basal ration

| Ingredie nts | % |
|---|---|
| Corn . . . . . | 50 |
| Decorticated cottonseed meal , , . . . . | 15 |
| Rice bran . . . . . | 20 |
| Wheat bran . . . . . | 10 |
| Blood meal . . . . . | 2.4 |
| Lime stone. . . . . | 2 |
| Common salt . . . . . | 0.5 |
| Vitamin premix (A + $D_3$)* . . . . . | 0.1 |
| Calculated values : ** | |
| Metabolizable energy, K cal/kg . . . | 2804 |
| Crude protein . . . . . | 17.25 |
| C/P ratio . . . . . | 162,5 |

* Vitamin premix contained Vit. A . . . . 5000 I.U. and Vit $D_3$ . . . . 500 I.U./gm.

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

significant increase ($P < 0.01$) in groups received the different levels of ammonium perchlorate and the larger dose of Catosal (3 ml/litre). The live body weight have a significant correlation ($P < 0.05$) with the paired testes weight at 16 weeks of age only.

When the ammonium perchlorate was added at a levels of 50 and 100 mg per kg ration, the blood serum urea and non-protein nitrogen showed significant decrease ($P < 0.05$) at 12 weeks of age. However, the total serum cholesteroel decreased singificantly ($P < 0.05$) in groups received 400 mg ammonium perchlorate per kg ration and 3 ml Catosal per litre drinking water (Table 2). This significant decrease in the blood serum urea, non-protein nitrogen and total cholesterol were not accompanied by any abnormal clinical manifestations. Moreover, all birds were healthy and active during the whole period of the experiment and the mortality rate was nil.

TABLE 2. Results of the experiment at 12 weeks of age.

| Different criteria | Control (basal ration) | Ammonium percelrate (mg/kg ration) | | | | | Catosal (ml/L water) | |
|---|---|---|---|---|---|---|---|---|
| | | 25 | 50 | 100 | 200 | 400 | 2 | 3 |
| Live body weight (g) . . . | 539± 26.5 | 515±24.2 | 546±22.8 | 560±26.7 | 521±31.2 | 518±28.1 | 496±21.8 | 517±22.4 |
| Paired testes weight (g). . . | 2.2± 0.12 | 2.5±0.23 | 2.6±0.14 | 2.5±0.16 | 3.8±0.62 | 2.15±0.58 | 1.86±0.26 | 2.63±0.87 |
| Sperm per gramme ($X10^6$) . | 0.0 | 4.8 | 4.5 | 4.0 | 2.0±0.4 | 5.1±0.72 | 4.5 | 5.7±0.74 |
| Sperm per testes ($\times 10^6$) . . | 0.0 | 11.6 | 11.5 | 9.7 | 8.2±0.64 | 10± 1.8 | 7.9 | 9.8± 3.2 |
| Number of cockerels with positive testicular sperm count | 0 | 2 | 1 | 1 | 4 | 3 | 1 | 5 |
| *Blood serum analysis* : | | | | | | | | |
| Urea (mg %) . . . . . | 15.9± 1.1 | 12.1± 1.1 | 11.9± 0.9 | 14.9± 0.7 | 16.6± 0.6 | 14.8± 0.8 | 15.9± 1.1 | 16.0± 1.2 |
| Non-protein nitrogen (mg %) | 18.4± 0.7 | 16.1± 0.1 | 16.1± 0.1 | 17.5± 0.4 | 18.3± 0.8 | 17.4± 0.3 | 18.9± 0.6 | 18.3± 0.3 |
| Total cholesterol (mg %) . . | 118,4± 8.5 | 110.5± 9.8 | 123.3± 7.3 | 95.0± 9.9 | 108.3± 8.7 | 90± 4.0 | 119.9±14.4 | 130.3± 6.9 |
| Number of cockerels . . . . | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

TABLE 3. **Results of the experiment at 16 weeks of age.**

| Different criteria | Control (basal ration) | Ammonium perchlorate (mg/kg ration) | | | | | Catosal )ml/L water) | |
|---|---|---|---|---|---|---|---|---|
| | | 25 | 50 | 100 | 200 | 400 | 2 | 3 |
| Live body weight (g) . . | 717± 28.8 | 902±32.2 | 957±38.2 | 1024±42.2 | 1024±46.8 | 1075±50.1 | 770±32.3 | 862± 4.3 |
| Paired testes weight (g) . . | 4.5± 0.61 | 9.3± 1.0 | 8.2± 0.9 | 8.3±0.51 | 6.8± 0.7 | 9.3 ± 0.8 | 4.7± 0.6 | 7.9± 0·72 |
| Sperm per gramme (× $10^6$) | 31.0± 2.9 | 52.3± 6.7 | 46.5± 3.3 | 39.8± 3.0 | 43.5± 4.4 | 52.8± 5.8 | 29.5± 6.7 | 41.7± 3.6 |
| Sperm per testes (X $10^6$) | 131.2±14.4 | 486.4±45.2 | 391.2±36.8 | 330.0±35.1 | 295.8±31.3 | 492.1±45.1 | 138.7±16.8 | 329.0±36.8 |
| Number of cockerels with positive testicular sperm count- | 4 | 5 | 4 | 5 | 5 | 5 | 3 | 3 |
| *Blood serum analysis* : | | | | | | | | |
| Urea (mg %) . . . . . | 15.8± 0.6 | 14.0± 0.7 | 14.2± 0.6 | 14.6± 0.8 | 15.0± 1.2 | 15.0± 0.3 | 16.0± 1.7 | 16.6± 1.1 |
| Non-protein nitrogen (mg%) | 17.9± 0.3 | 17.0± 0.3 | 17.1± 0.3 | 17.4± 0.4 | 17.8± 0.6 | 17.5± 0.2 | 18.0± 0.9 | 18.3± 0.6 |
| Total cholesterol (mg %) . | 104.8±10.5 | 113.8±10.8 | 84.6±10.8 | 81.0± 5.2 | 79.0± 5.4 | 72.8± 2.8 | 83.0± 5.1 | 70.0± 3.1 |
| Number of cockerels . . . | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

## DICSUSSION

The appearance of spermatozoa in the testes of some cockerels in the treated groups at 12 weeks of age, indicates that the ammonium perchlorate and Catosal could bring an earlier attainement of sexual maturity in Fayoumi breed. The invaluable differences observed in the live body weigh and paired testes weight at such earlier age between the treated and control groups agree with the findings of El-Hammady *et al.*, (1975) and El-Amrousi *et al.* (1975).

Rageb (1972) and Amer (1974) found that ammonium perchlorat supplement which induced hypofunction of the thyroid gland is accompanied by desrease in the catabolic processes with consequent improvement in live weight. Earlier studies done by Benoit and Aron (1934) and Blivaiss and Domm (1942) reported that the live body weight and testicular size of Leghorn cockerels decreased markedly after thyroidectomy. Moreover, Andrews and Schetzler (1946); Shaffner and Andrews (1948); and Kumaran and Turner (1949) fed cockerels a ration containing low doses of thiouracil and repor ed variable adverse response in the functional activity of the testes. It seems possible that the used levels of ammonium perchlorate induced an optimum condition of thyroid activity accompanied by rapid gain in live weight and early attainment of sexual maturity in growing Fayoumi chicks.

The favourable influence of Catosal upon reproduction may to be due to its organic phosphorus content and vitamin $B_{12}$. It is evident from the literature of Moustgaard (1959) and Osman. Baksai and Magdolna (1970) that phosphoru is of vital importance for animal reporduc ion. Moreover, El-Amrousi *et al.*, (1975) reported that vitamin $B_{12}$ may promote protein, carbochydrate and fat metabolism in chickens.

The significant effect of ammonium perchlorate and Catosal (3 ml per litter water) upon the activity and capacity of the testes to produce spermatozoa was well manifested at 16 weeks of age. This may indicat a remote gradual favourable influence of these two compounds upon reproduction.

The significant correlation reported between th live body weight and testes weight may indicate that the factors controlling their growth are similar during the first 16 weeks of age in Fayoumi cockerels.

The variable decrease in the blood serum urea and non-protein nitrogen in goups received ammonium perchlorate is in agreement with the find ngs of Jolobdina (1960) and Amer (1974) in guinea pig and rams respectiv ly. Solon, Yakimenko and Mihailov (1972) explained that ammonium perchlorate acts as a thyrostatic factor and its administration leads to decrease in the proteolytic enzymes of the blood and tissue with consequent lowering in th nitrogenous compound of the bolood.

The results reported for the levels of blood serum cholesterol in Fayoumi cockerels received ammonium perchlorate are in general accordance with those published by Komorauskia (1962) and Kliniski (1967) and Icaiev (1968).

These authors reported that an intimate reverse relationship is present between the functional activity of the thyroid gland and the total serum chloesterol levels.

The invaluable changes in the blood serum urea, non-portein nitrogen and total chloesterol in cockerels received Catosal additives lead us to consider this preparation to be a growth promoting factor especially when given at a level of 3 ml per litre water.

It is of importance to mention that all the data reported in the blood serum urea, non-protein nitrogen and chloesterol of the studied cokerels lies within the normal physiological limits published by Cole and Boyd (1965); Dua, Dilworth, Elbert and Hill (1957) and Meigs, Littlefield, Frobish and Weinland (1974).

As a main conclusion from this experiment it is advisable to use either the ammonium perchlorate or the Catozal additives at a level of 400 mg/kg ration and 3 ml/litre water respectively for growing chicks in order to get better gain in body weight and noticeable improvement in testicular sperm production up to the marketing age of 16 weeks without any undesirable effect upon their condition.

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