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EFFECT OF CHROMIUM PICOLONATE ON GROWTH, BLOOD PARAMETERS AND CARCASS TRAITS OF GROWING NEW ZEALAND WHITE RABBITS.

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ABSTRACT

Total of 20 New Zealand White (NZW) male bunnies weaned at 5 weeks of age having average live body weight of 620±20.2 g were used in experiment study to study the effect of daily treatment of chromium picolinate (CrP) on growth performance in relation to blood parameters, carcass traits, chemical analysis of meat and economic efficiency. Rabbits were divided into 2 groups, 10 animals in each. Rabbits in the 1st group were served as control (G1) without any treatment. However, those in the 2nd group (G2) were given daily oral dose from CrP at levels of 9 µg/kg body weight from 5 up to 10 weeks of age. All growing rabbits were kept under similar feeding and managerial conditions. Blood samples were collected biweekly for Cr determination and at slaughtering for biochemical determination. Three males from each group were randomly taken and slaughtered at 13 weeks of age for carcass traits and chemical composition of meat. Results show a tendency of slight improvement in growth performance of treated than in control rabbits, but the differences were not significant. Treatment with CrP decreased (P<0.05) concentration of albumin, albumin/globulin ratio, glucose, cholesterol, urea and creatinine, and activity of AST and ALT in serum. The group differences in concentration of total protein and globulin concentration were not significant. An increase (P<0.05) in net carcass weight and total weight of edible organs was observed in treated compared with control rabbits, reflecting impact of CrP treatment on dressing percentage (61.1 and 56.6%, respectively). Absolute and relative weights of heart were almost higher in treated than in control group. Weight of skin and legs was heavier in control than in treated group (433.3 vs. 369.7 g). Crude protein content in meat was higher (P<0.05) in G2 than in G1 (70.7 vs. 63.8%). Content of EE tended to decrease from 31.5% in G1 to 24.5% in G2. Chromium concentration was higher (P<0.05) in serum of G2 than in G1 by about 15%. Rabbits in G2 had higher Cr concentration in serum at all sampling times and in meat after slaughter (1.53 vs. 1.36 ppm) in G2 than in G1. Viability rate was 100 in G1 and G2 during the experimental period.

Based on the foregoing results of the current study, treatment of growing rabbits with daily oral dose of chromium piclonate at a level of 9 µg/kg LBW improved growth performance, feed conversion, carcass quality and net revenue. The obtained high CP and Cr contents and low fat content in meat of rabbits treated with Cr may suggest the possibility of its consumption for diabetic patients and as anticholesteroleamic meat.

Keywords: Rabbit, chromium picolinate, growth, blood, carcass, economic efficiency.

INTRODUCTION

There is a growing awareness of the beneficial role of trace elements, which play a role in promoting health and growth. Chromium (Cr) is intimately involved in lipid, carbohydrate and protein metabolism and is therefore postulated to function as an antioxidant because it is an insulin potentiator, (Preuss *et al.,* 1997). In addition, Cr is thought to be essential for activating certain enzymes and for stabilizing proteins and nucleic acids (Linder, 1991).

A form of Cr that has recently received attention is the organically complexed Cr source, chromium picolinate (CrP). This form of Cr consists of one molecule of ($Cr3+$) complexed with three molecules of picolinic acid. Several studies have shown that dietary CrP supplementation can improve performance and increased the plasma insulin concentration of laying hens (Sahin *et al.,* 2001) under cold stress. In rats, Cefalu *et al.* (2002) reported that CrP enhances insulin sensitivity and glucose disappearance and improves lipids in male obese hyperinsulinemic.

In addition, the use of Cr has been suggested to have positive impacts on farm profitability, and many animal health benefits, including increased longevity; enhanced reproduction, improved immune response and lean carcass quality (Mooney and Cromwell,1997). Dietary chromium supplementation has been shown to positively affect growth rate and feed efficiency of growing poultry (Lien *et al*., 1999 and Sahin *et al.,* 2001). The effect of Cr supplementation on the intensity of growth has been studied especially in pigs and cattle. In cattle, a positive effect of Cr supplementation on weight gain has been recorded by some authors (Moonsie-Shageer and Mowat, 1993), while others have found no positive effect (Swanson *et al*., 2000).

Although many researchers have suggested that Cr should become a key ingredient in nutritional supplements, official studies such as the USA National Research Council (NRC), animal nutrition subcommittees have not yet made final recommendations on minimum dietary Cr requirements for any farm animals or poultry species. The results available in the literature of the effect of Cr on performance of male or female rabbits were focused practically on rabbits at older ages (Hamed 2005 and Nasif, 2008). However, the information on the effect of different doses from CrP on growth performance of growing rabbits are not available in the literature.

Therefore, the present work included studying the effect of daily treatment of chromium picolinate (9 µg/kg LBW), from 5 up to 10 wk of age, on growth performance in relation to blood parameters, carcass traits, chemical analysis of meat and economic efficiency at 13 wk of age.

MATERIALS AND METHODS

The experimental work was carried out in Rabbit Session, Sakha Experimental Station belonging to Animal Research Institute, Agricultural Research Center in cooperation with Department of Animal Production, Faculty of Agriculture, Mansoura University, Egypt, during the period from November 2007 to May 2008.

Animals:

A total of 20 NZW male bunnies weaned at 5 weeks of age having average live body weight of 620±20.2 g was used in this study. Rabbits were divided into 2 groups, 10 animals in each. Animals were housed in pairs in flat-deck cages made of galvanized wire (50 x 60 x 40 cm) prepared with water nipple.

Rabbits in the 1st group were served as control (G1) without any treatment. However, those in the 2nd group (G2) were given daily oral dose from chromium picolinate at levels of 9 µg/kg body weight from 5 up to 10 weeks of age.

Feeding system:

All growing rabbits were kept under similar feeding and managerial conditions during an experimental period from 5 to 13 wk of age. Animals were fed *ad. libitum*, on commercially complete feed diet in pelleted form. Ingredients and chemical composition of the complete feed diet is presented in Table (1). Chemical analyses of feeds were determined according to A.O.A.C. (1980).

Table (1): Composition of complete feed diet used in rabbit feeding.

Ingredient	%	Item	Chemical analysis (on DM basis, %)
Wheat bran	30.0	DM	88.61
Soybean meal, 44%	16.0	OM	90.49
Yellow corn	20.0	CP	17.9
Barley grain	30.0	EE	1.74
Limestone	1.0	CF	10.93
Premix*	0.5	NFE	59.92
Sodium chloride	0.5	Ash	9.51
Di-Ca phosphate	2.0	-	-
Total	100	Total	100

*** One kg of premix contained 3.3 x 10^6 IU Vit. A; 3.3 g Vit. E; 3.3 x 10^6 IU Vit. D_3; 0.33 g Vit. K; 0.33 g Vit B_1; 1.33 Vit. B_2; 6.67 Vit B_5; 0.50 g Vit B_6; 3.3 g Vit. B_{12}; 3.3 Pantothenic acid; 0.33 Folic acid; 16.67 mg Biotin; 166.67 g Cholin; 1 g Copper; 10 g Iron; 13.3 g Mn; 15 g Zn; 0.1 g Iodin; 0.03 g Se and Carrier $CACO_3$ to 1 kg.**

Experimental procedures:

During an experimental period from 5 up to 13 weeks of age, live body weight (LBW) and feed intake of rabbits in all groups were biweekly recorded to study changes in growth performance. Then, the daily gain, feed intake and feed conversion were biweekly calculated.

Blood sampling:

Throughout the experimental period from 5 wk of age (pre-treatment), blood samples were biweekly (0, 2, 4, 6 and 8 wk of age) collected from the ear vein of five rabbits in each group into test tubes to determination of Cr in blood serum. However, blood samples were collected at end of the experiment immediately after slaughter for blood biochemicals determination. Blood serum was separated by centrifugation at 3000 rpm for 15 min and was stored for analysis at –20ºC.

Slaughter procedure:

At the end of the experimental period, three males from each group were randomly taken and weighed before slaughter. After complete bleeding, the head, pelt, viscera, feet and tail were removed. Immediately after slaughtering, the gastrointestinal tract of each animal was removed and full segments of the digestive tract were separated and weighed with their contents.

Weight of carcass (dressed weight) was recorded, and then dressing percentage was calculated. Weights of edible and in-edible organs were recorded. Samples from meat from the right caudal side of the carcass were taken for chromium analysis.

Analytical methods:

In blood samples, concentration of glucose in fresh serum, total protein, albumin and cholesterol, and activity of asprtate transaminase (AST) and alanin transaminase (ALT) were determined colorimetrically in stored serum using commercial kits. However, concentration of globulin was computed by subtracting albumin from total protein. Concentration of Cr was biweekly determined in blood serum and in meat of slaughtered rabbits as described by Chang *et al*. (1992) using graphite furnace atomic absorption pectroscopy.

All blood parameters were estimated using spectrophotometer (spectronic 21 D, USA, 1988) and commercial kits produced as described by authors according to the following table:

Parameter	Author(s)
Total protein	Cornall *et al*. (1949)
Albumin	Weichselaum (1946)
Glucose	Trinder (1969)
Total cholesterol	Watson (1960)
Urea	Patton and Crouch (1977)
Creatinine	Wilding *et al*. (1977)
AST and ALT	Reitman and Frankal (1957)

Statistical analysis:

The obtained data was statistically analyzed according to Snedecor and Cochran (1982) using computer programme of SAS system (1987).

RESULTS AND DISCUSSION

Growth performance:

Effect of chromium treatment on all growth parameters of rabbits (Table 2) was not significant. However, there was a tendency of slight improvement in growth performance of treated than in control rabbits.

The effect of Cr supplementation on the intensity of growth has been studied especially in pigs and cattle, not in rabbits. In cattle, a positive effect of Cr supplementation on weight gain has been recorded by Moonsie-Shageer and Mowat (1993), while Bunting *et al*. (1994); and Swanson *et al*. (2000) have found no positive effect on cattle as found in rabbits in this study.

Most authors mentioned that Cr supplementation during periods of increased stress has a positive effect on weight gain. At longer intervals after increased stress (sale, moving or transport), no positive effect of Cr supplementation on growth intensity has been found. The above mentioned results have also been confirmed by experimental results on pigs. Page *et al*. (1993) have found an increase in weight gain when supplementing Cr (0.05 and 0.2 mg/kg ration), but a decrease when supplementing 0.1 mg/kg of the feeding ration. Other studies (Mooney and Cromwell, 1995, 1997) have confirmed the positive effect of supplementing 0.2 mg/kg of Cr on gain, but not on nutrient conversion.

Table (2): Growth performance parameters of rabbits in control and treatment groups during the experimental period.

Parameter	G1	G2
Av. initial weight (g)	619.0±19.8	622.0±21.25
Av. final weight (g)	2148.5±47.4	2290.5±37.5
Total weight gain (g)	1529.5±98.3	1668.5±93.04
Average daily gain (g)	26.1±1.91	29.8±1.62
Average total feed intake (g)	5973.9±105.2	6186.3±103.55
Average daily feed intake (g)	103.0±1.84	106.7±1.78
Feed conversion ratio (intake, g/g gain)	4.04±0.19	3.58±0.21

G1: Control G2: 9 µg/kg LBW

The wide variation in the effect of Cr negatively or positively on growth performance may be due to species and/or dose differences. In this respect, Page *et al*. (1993) found that supplementation of 0–0.8 mg from Cr/kg ration has led to a decreasing linear trend regarding fodder intake as well as weight gain with growing Cr doses. Other studies have reported no weight gain increase when Cr supplementation was lower than 0.25 mg/kg (Boleman *et al*., 1995 and Lindemann *et al*., 1995b). A similar recent study of Lien *et al*. (2005) with CrP (0.2 mg/kg) in weanling pigs at 4 weeks old, during nine weeks of the experiment, indicated that Cr had no effect on growth performance.

In agreement with the present results of feed intake, Lien *et al.* (1999) and Sahin *et al*. (2002a) reported that increasing supplemented Cr in broiler diets significantly increased feed consumption. Also, Sahin *et al.* (2002b) found that increasing supplemental CrP in laying Japanese quail diets increased feed intake. Moreover, Chen *et al.* (2001) reported that turkey males received 1 mg/kg Cr supplementation significantly increased feed intake at 9-18 wks of age.

Blood parameters:

Effects of Cr treatment on blood parameters are shown in Table (3). The present results indicated a significant ($P<0.05$) decrease in concentration of albumin, albumin/globulin ratio, glucose, cholesterol, urea and creatinine as well as significant ($P<0.05$) decrease in activity of AST and ALT in serum of treated rabbits as compared to the control ones. However, the differences in total protein and globulin concentrations were not significant.

These results regarding total protein are keeping with those reported by Chen *et al.* (2001), who found that dietary Cr supplementation at 1 or 3 mg Cr/kg diet to male turkey diets for 14 weeks did not significantly influence serum total protein compared to control.

The observed decrease in glucose concentration in treated rabbits was indicated by Chen *et al.* (2001), who reported that dietary Cr supplementation at 3 mg/kg significantly decreased glucose concentration in plasma of turkey. Similar trend was reported by dietary Cr supplementation in broiler diets (Lien *et al.* 1999, Sahin *et al.* 2002a and Uyanik *et al.,* 2002). In this line, Cupo and Donaldson (1987) reported that dietary Cr supplementation increased (16%) rate of glucose utilization in liver tissue, which explains the decrease in glucose levels obtained in this study. Chromium is generally accepted as the active component in the glucose tolerance factor, which increases the sensitivity of tissue receptors to insulin, resulting in increased glucose uptake by cells (Abraham *et al.,* 1992). Furthermore, Anderson *et al.* (1991) suggested Cr involvement in carbohydrate metabolism including glucose uptake, glucose utilization for lipogenisis, and glycogen formation.

Table (3): Concentration of some biochemicals and activity of transaminases in blood serum of rabbits in control and treatment groups at end of the experimental period (13 wk of age).

Parameter	G1	G2	Sign.
Protein metabolism:			
Total protein (g/dl)	9.06±0.76	8.84±0.38	NS
Albumin (g/dl)	5.88±0.2	4.69±0.43	*
globulin (g/dl)	3.18±0.66	4.15±0.05	NS
Albumin/ globulin ratio	1.84	1.13	-
Carbohydrate metabolism:			
Glucose (mg/dl)	128.33±1.66	101.66±4.4	*
Lipid metabolism:			
Cholesterol (mg/dl)	121±2.64	95.33±8.37	*
Kidney function:			
Creatinine (mg/dl)	1.18±0.02	0.92±0.03	*
Urea (mg/dl)	61.33±3.17	44.33±1.76	*
Transaminases activity (AST and ALT)			
AST(U/l)	34.00±1.73	14.0±1.52	*
ALT (U/l)	19.33±1.20	8.00±1.52	*

G1: Control G2: 9 µg/kg LBW NS: Not significant * Significant at P<0.05

Additionally, the results obtained in this study regard to the significant (P<0.05) decrease in concentration of total cholesterol in serum of treated rabbits are in agreement with the results of Anderson (1999) and Sahin *et al.* (2002a). They reported that increased supplemental Cr decreased blood cholesterol concentration. Moreover, in non-ruminants serum total cholesterol concentration was reduced (Mertz, 1993 and Lindemann *et al*., 1995a).

In contrast to the present results, Chen *et al*. (2001) reported that dietary Cr supplementation at 1 mg Cr/kg diet to male turkey diets for 14 weeks did not significantly influence serum creatinine, but increasing Cr supplementation up to 3 mg Cr/kg significantly increased creatinine concentration at 22 weeks of age. Also, Shinde *et al*. (2003) reported that concentration of urea and creatinine as well as activity of AST and ALT in serum of healthy rats treated with CrP were not significantly different from those of the controls.

Carcass traits and chemical composition of meat:

Data of carcass traits presented in Table (4) show a significant increase (P<0.05) in net carcass weight (including the upper, mid and lower portions) and total weight of edible organs (head, liver, heart, kidney, spleen and testes) in treated compared with control rabbits, reflecting impact of Cr treatment on dressing percentage (61.1 and 56.6%, respectively).

In agreement with the present results, Ibrahim (2005) found that carcass weight and carcass percentages significantly increased (P<0.05) in groups received Cr supplemented diet compared with the control group.

Although liver weight was significantly higher in treated than control group, hepato-somatic index did not differ significantly between both groups. These results are similar to those reported by Page *et al.* (1993), who found that liver weight was not affected by Cr supplementation.

Additionally, absolute and relative weights of heart were almost higher in treated than in control group indicating marked effect of Cr treatment on increasing heart weight. Interestingly to note that weight of skin and legs was heavier in control than in treated group (Table 4).

Table (4): Carcass traits of slaughtered rabbits in control and treatment groups at end of the experimental period.

Item	G1	G2	Sign.
Pre-slaughter weight (g)	2000.0±85.44	2296.7±101.7	-
Carcass net weight (g)	921.4±12.9	1151.9±12.8	*
Upper region weight (g)	335.3±3.38	401.8±14.30	*
Lower region weight (g)	345.4±7.69	442.1±13.80	*
Mid region weight (g)	240.7±19.3	308.0±5.680	*
Weight of edible organs (g):			
Head	120.0±2.02	134.6±7.97	NS
Liver	62.6±3.13	77.6±4.55	*
Hepato-somatic index (%)	3.1±0.32	3.4±0.25	NS
Heart	6.2±0.36	11.4±1.83	*
Heart/LBW (%)	0.31±0.001	0.50±0.006	*
Kidney	15.5±0.95	16.53±1.7	NS
Kidney/LBW (%)	0.78±0.007	0.72±0.011	NS
Spleen	1.45±0.39	2.0±0.90	NS
Testes	4.3±0.24	5.5±0.14	NS
Testes/LBW (%)	0.22±0.002	0.24±0.003	NS
Total	210.1±1.3	250.7±6.17	*
Edible organs + carcass (g)	1131.5±28.2	1402.6±36.5	*
Dressing (%)	56.6±1.10	61.1±1.50	*
Weight of edible organs (g):			
Lung	10.5±0.740	11.12±0.96	NS
Viscera	367.9±51.8	365.4±50.6	NS
Viscera/LBW	0.18±0.018	0.15±0.015	NS
Skin and legs	433.3±16.5	396.7±18.3	*
Blood	56.66±6.66	63.33±13.3	NS
Total	868.5±72.0	894.1±79.1	NS

G1: Control G2: 9 µg/kg LBW NS: Not significant * Significant at P<0.05

Regarding the effect of Cr treatment on chemical composition of meat, results in Table (5) show significant (P<0.05) increase only in CP content, being higher in meat of treated than in control rabbits (70.7 vs. 63.8%). This could be explained by the metabolic action of Cr on increasing protein deposition (Mooney and Cromwell, 1997 and Sahin *et al*., 2002b) and is thought to have a role in nucleic acid metabolism because it increased amino acid incorporation into liver protein *in vitro* (Weser and Koolman, 1969).

It is worthy noting that, the observed reduction in CP in treated group was associated with a tendency of lower EE content from 31.5% in control to 24.5% in treated group.

Table (5): Chemical analysis of meat of slaughtered rabbits in control and treatment groups at end of the experimental period.

Item	G1	G2	Sign.
CP (%)	63.8±2.71	70.7±2.41	*
EE **(%)**	31.5±3.01	24.5±2.58	*
Ash (%)	4.72±0.47	4.76±0.18	NS

In accordance with the obtained results, Ibrahim (2005) found significant decreases ($P<0.05$) in abdominal fat weight, subcutaneous fat weight, total body fat weight and percentages in all chicken groups received Cr supplemented diet (10-50 mg Cr per kg diet) compared with the control group. Similar results were reported by Hossain (1995); Hossain *et al*. (1998); Choct (1999) and Sahin *et al*. 2002a). Moreover, Ward *et al*. (1993) reported a tendency for 200 ppb of CrP to increase protein percentage and decrease fat percentage of 3-wk old broiler chick carcass. This may be due to a tendency of decrease in fat deposition in the tissue.

Such findings in carcass traits may indicate good carcass quality of treated rabbits, which are desirable for human consumption and in comparing with the control.

Chromium profile:

Chromium concentration in blood serum of rabbits as affected by treatment and sampling time presented in Table (6) shows significantly ($P<0.05$) higher concentration in serum of treated than in control rabbits by about 15%. However, the effect of sampling time on Cr level was not significant, ranging between 1.08 and 1.20 ppm during all sampling times.

Also, the effect of interaction between treatment and sampling time on Cr level was insignificant indicating higher Cr concentration in treated than in control rabbits at all post-treatment sampling times (Fig. 1).

In agreement with the present results, Anderson *et al*. (1989) reported that Cr concentrations of breast, liver, kidney were linearly increased with the increasing organic Cr supplementation. Also, Sahin *et al*. (1996) found that levels of chromium increased in the serum of sheep grazed plants around Ferrochromium Factory. Chromium concentrations were 0.009, 0.092, 0.023 and 0.0125 µg/ml in serum of animals and 0.850, 6.580, 2.730 and 1.858 ppm in plants of control (60–80 km from factory), 4 and 8 km from factory, respectively. On the other hand, Sahin *et al*. (2001) found that supplemental Cr did not affect Cr content in serum and tissue of rabbits and Cr in the diet up to 400 ppb did not result in toxic accumulation in any tissue. Also, in steers, Chang *et al*. (1992) reported that Cr supplementation of steers did not affect Cr contents in rib lean, liver, rib fat and kidney. This difference may be due to species/does differences.

Likewise, possibly, Cr may be an element participating in certain enzymes activities that the most common being zinc and copper (Burton *et al*., 1993 and Fielden and Rotilio, 1984). So, its presence in meat for human consumption is very important from the economic point of view.

Table (6): Concentration of chromium in blood serum of rabbits as affected by treatment and sampling time.

	Chromium concentration (ppm)	
Item	**Blood serum**	**Meat**
Effect of treatment:		
G1	1.07±0.05^{b}	1.36±0.033^{b}
G2	1.24±0.03^{a}	1.53±0.028^{a}
Significance	P<0.05	P<0.05
Effect of sampling time (week) of treatment:		
0	1.20±0.03	-
2	1.18±0.04	-
4	1.16±0.07	-
6	1.08±0.09	-
8	1.15±0.13	-
Significance	NS	-

G1: Control G2: 9 µg/kg LBW NS: Not significant * Significant at P<0.05

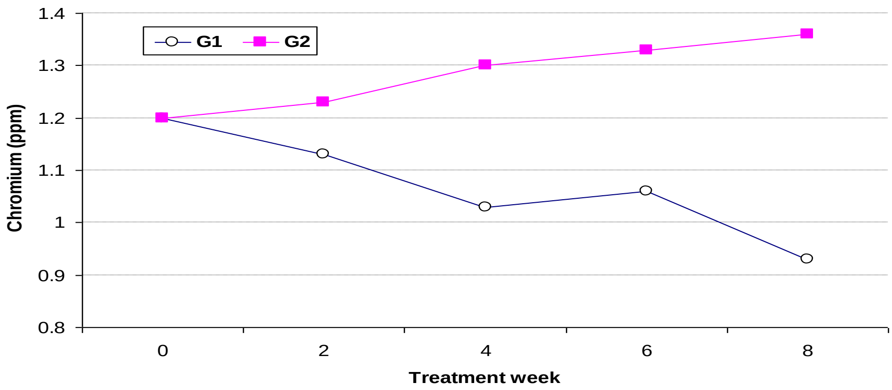

Fig. (1): Change in chromium concentration in blood serum of rabbits in control and treatment groups during the experimental period.

Viability rate and economic efficiency:

It is of interest to record that viability rate was 100% in the control and Cr supplemented groups, during the experimental period from 5 to 13 wk of age (Table 7).

Economic evaluation of chromium treatment as compared to control (Table 7) shows that rabbits in treated group (G2) increased total cost of feeding as a result of increasing feed intake and cost of Cr treatment.

However, the observed increase in total gain of rabbits in G2 improved net revenue by about 7.2% as compared to controls.

Table (7): Viability rate and economic analysis of chromium treatment.

Item	G1	G2
Viability rate (%)	100	100
Total feed intake (kg/h)	5.97	6.19
Cost of feeding (L.E./h)	9.56	9.90
Cost of treatment (L.E./h)	-	0.85
Total cost of feeding (L.E./h)	9.56	10.75
Total weight gain (kg/h)	1.53	1.67
Total revenue (L.E./h)	26.01	28.39
Net revenue/h	16.45	17.64
Relative net revenue	100	107.2

G1: Control G2: 9 µg/kg LBW, Price of each kg feed intake and kg gain was 1.6 and 17 L.E., respectively according to market prices at 2008.

Based on the foregoing results of the current study, treatment of growing rabbits with daily oral dose of chromium piclonate at a level of 9 µg/kg LBW improved growth performance, feed conversion, carcass quality and net revenue. The obtained high CP and Cr contents and low fat content in rabbit meat supplemented with Cr may suggest the possibility of its consumption for diabetic patients and as anticholesteroleamic meat.

Further studies are required to indicate the medical effect of meat produced from rabbits supplemented with Cr.

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تـأثير الكروميـوم بايكولونيـت علـي النمـو وقياسـات الـدم وصـفات الذبيحـة لأرانـب النيوزيلاندي النامية

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إسـتخدم فـي هـذه الدراسـة ٢٠ ذكـر أرانـب نيوزيلنـدي أبـيض كـان متوسـط وزنهـم ٦٢٠±٢٠,٢ جـرام عند الأسبوع الخـامس مـن عمـرهم لدراسـة تـأثير المعاملـة اليوميـة بـالكروميوم بايكولونيت علـي الأداء الإنتـاجي وعلاقتـه بقياسـات الـدم وصـفات الذبيحـة والتحليـل الكيمـاوي للحـم والكفاءة الإقتصادية.

فقد تم تقسيم الأرانب إلى مجموعتين تحتوي كل منها علي ١٠ أرانب . المجموعـة الأولـي إستخدمت للمقارنة بدون معاملة في حين الثانية أعطيت جرعة فميه يومية من الكروميوم بايكولونيت بمعدل ٩ ميكروجرام/كيلوجرام من الوزن من عمر ٥ إلـى ١٠ أسـابيع. كل الأرانـب وضـعت تحت ظروف غذائية ورعاية واحدة
تم تجميع عينات الدم كل أسبوعين لقياس عنصر الكروم وعند الذبح للقياسات الحيوية. وتم إختيـار ٣ ذكـور عشـوائيا مـن كـل مجموعـة وكـان عمـرهم ١٣ أسـبوعا لقيـاس خصـائص الذبيحـة والتركيـب الكيماوي للحم.

أوضـحت النتـائج قابلية الأرانب للزيـادة الخفيفـة فـي الـوزن فـي المجموعـة المعاملـة مقارنـة بأرانـب مجموعـة المقارنـة ولكن الفرق غير معنـوي. وأظهـر فـي التجربـة أن المعاملـة بـالكروميوم بايكولونيت قللت الألبيـومين وكذا النسبة بين الألبيـومين والجلوبيـولين والجلوكـوز والكوليسـتيرول واليوريا والكرياتينين وقللت النشـاط الأنزيمـي للكبد (AST & ALT) في السيرم ولكن الفرق بين المجموعات في تركيز البروتين الكلي والجلوبيولين لم يكن معنويا. وأظهرت التجربة كذلك زيادة في وزن الذبيحة الصافي والأجزاء المأكولة زيادة معنوية في المجموعة المعاملة عن المقارنـة. ويعكس تـأثير معاملـة الكـروم علـي نسبة التصـافي ٦١,١ و ٥٦,٦ علـي الترتيب الـوزن الحقيقـي والـوزن النسبي للجسم الكلي للقلب كان غالبا أعلي في المجموعة المعاملة عن المقارنـة. وزن الرجـل والجلد كـان اقـل فـي المجموعـة المعاملـة عن المقارنـة ٣٦٩,٧ مقابـل ٤٣٣,٣ جـرام. كانـت زيـادة معنويـة للبروتين الحقيقي في المجموعة المعاملة عن المقارنـة ٧٠,٧ مقابل ٦٣,٨. ومستخلص الدهن يميل إلى الانخفاض من ٣١,٥ في المجموعة الأولي إلى ٢٤,٥ في المجموعة الثانية. تركيز الكروم كـان عاليا في السيرم في المجموعة الثانية عن المجموعة الأولي بـ١٥%. الأرانب فـي المجموعـة الثانيـة كان بها تركيز عالي من الكروم في السيرم فـي كل العينـات واللحم بعد السلخ ١,٥٣ مقابـل ١,٣٦ جـزء فـي المليـون. معدل الحيويـة كـان ١٠٠% فـي المجمـوعتين المعاملـة و المقارنـة أثنـاء الفتـرة التجريبية.

وبنـاء علـي النتـائج السـابقة فـي هذه الدراسـة فـإن معاملـة الأرانـب الناميـة يوميـا بـالتجريع (كروم بمستوي ٩ ميكروجرام لكل كيلوجرام وزن حـي) حسنت خصـائص النمـو ومعامـل التحويـل الغذائي وخصائص الذبيحة والربح الصـافي. أيضا والنتائج المتحصل عليها لارتفاع محتوي البروتين والكروم وإنخفاض محتوي الدهن في لحم الأرانب المعاملـة قد يقترح إمكانيـة إستهلاك هذه اللحـوم لمرضـي السكر وكذلك كلحم قليل الكوليسترول.