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# Effect of adding chromium yeast in diet on broiler Ross 308 performance

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## Abstract

An experiment was conducted to evaluate the effect of chromium yeast (Cr yeast) on growth performance and carcass of broiler chickens. Three hundred day old chicks of Ross 308 were arranged in a complete random design experiment and allotted to one of four Treatment1 (Control) $T_1$: The basal diet without supplementation of Cr yeas, Treatment 2 ($T_2$): The basal diet + 0.5 mg Cr yeast/kg diet, Treatment 3 ($T_3$): The basal diet + 1.0 mg Cr yeast/kg diet. Treatment 4 ($T_4$): The basal + 1.5 mg Cr yeast/kg diet. The results showed that body weight and weight gain were highly significant ($P<0.05$) by supplementing chromium yeast, feed intake and feed conversion were significantly ($P<0.05$) higher in the groups that were supplemented with Cr yeast as compared with the other groups. Dressing percentage was significantly ($P\leq0.05$) higher in all groups supplemented with chromium yeast as compared to the control group, while breast percentage was significantly ($P\leq0.05$) higher in the groups that were supplemented with chromium yeast as compared to the control group ($A_1$).

Keywords: Broiler chickens, Chromium yeast, Growth performance, Carcass yield.

## Introduction

Chromium deficiency is accepted as nutritionally essential for animals and human. NRC (1989) has recommended an intake of 50 to 200 ppb of trivalent chromium for adult humans. However, an appropriate recommendation on the chromium requirement for poultry has not been made NRC (1994) and most poultry diets are basically composed of plant origin ingredients which have usually a low content of chromium (Giri *et al*., 1990). Studies have confirmed that chromium plays a crucial role in carbohydrate, lipid and protein metabolisms both in mammals and in birds. Although an appropriate recommendation on the chromium requirement of poultry has been not made (NRC, 1994). Kim *et al.*, (1995) found that body weight gain was affected by the level of dietary crude protein or lysine when supplemented with 200 ppb Cr Pic.

Hossain *et al.*, (1998) supplemented broiler chickens diet with Cr yeast at levels of 0, 300, 400 and 1600 µg/kg in three experiments. Concerning the feed conversion ratio Kim *et al.*, (1995) stated that conversion ratio was improved by the levels of dietary crude protein or lysine when supplemented with Cr Pic during fattening of female chickens of large white Turkey hybrid, Effect of chromium on feed intake was studied by Motozono *et al.* (1998). They noticed that feed intake tended to decreased in all Cr supplemented broiler chicken groups (0, 200 and 400 ppb) and Cr yeast tended to have a greater negative effect on feed intake than Cr Pic. Mohamed and Afifi (2001) and Uyanik *et al.* (2002) found that chromium supplementation 20 and 40 ppm $CrCl_3$ reduced feed intake. The effect of chromium on carcass yield was investigated by Hossain *et al.* (1998) who found that breast meat yield was improved with supplemental Cr at 300 or 400 µg/kg. Sands and smith (1999) concluded that Cr Pic supplementation at 200 or 400 µg/kg under heat stress or thermo neutral increased percentage yield of carcass, breast and leg. Holoubek *et al.* (2000) found that weight of breast and thigh muscles in cockerels tended to increase by Cr Pic supplement at level 300 µg/kg diet. Chen *et al.* (2001) showed that breast and thigh muscle were significantly increased in birds which received 1 mg/kg chromium nicotinate but decreased by 3 mg/kg of supplementation.

## Materials and Methods

The experiment were conducted at poultry farm, dept. of Animal Science, College of Agriculture, Kirkuk University. The aimed of this experiment to investigate the effect of adding different levels of chromium yeast (Cr yeast) to the broiler chickens diet on performance, carcass quality and some blood constituents. experiments birds were raised from day – old to 6 weeks of age. Ross 308 broiler chickens were randomly allocated to floor pens and used wood shavings as a litter (25 chicks per pin). All chickens were vaccinated against the common local diseases according to the recommended vaccination program. Three hundred one – day old Ross 308 broiler chickens were allocated randomly into four

treatment groups of 75 birds and divided into three replicates with 25 birds each. In this experiment four different dietary treatments were used as follows:
Treatment1(Control)$T_1$:The basal diet (table1) without supplementation of Cr yeast.
Treatment 2 ($T_2$): The basal diet + 0.5 mg Cr yeast/kg diet.
Treatment 3 ($T_3$): The basal diet + 1.0 mg Cr yeast/kg diet.
Treatment 4 ($T_4$): The basal diet + 1.5 mg Cr yeast/kg diet.

Weekly live body weights, Feed consumption was recorded weekly for each replicate after the reduction of feed wastage remain, Feed conversion ratio was calculated weekly, dressed carcass were weighed and calculated as percentage of live body weight.

Table(1): Diet formulation and compositions (%).

| Ingredients | Starter (0 to 21 d) | Grower (22 to 42 d) |
|---|---|---|
| Corn | 58.40 | 63.80 |
| Soybean meal (43% CP) | 33.70 | 28.20 |
| Oil | 2.90 | 3.00 |
| Fish meal (60.2% CP) | 1.50 | 1.50 |
| Dicalcium phosphate | 1.40 | 1.40 |
| Limestone | 1.20 | 1.20 |
| Salt | 0.21 | 0.21 |
| dl-Methionine | 0.19 | 0.19 |
| Vitamin-mineral premix | 0.50 | 0.50 |
| Calculated composition | | |
| ME, kcal/kg | 3,049 | 3,095 |
| CP, % | 21.00 | 19.05 |
| Calcium, % | 0.96 | 0.94 |
| Total phosphorus, % | 0.68 | 0.64 |
| Lysine, % | 1.13 | 0.97 |

Statistical analysis: Completely randomized design (CRD) was used to study the effect of different treatment in all traits. Duncan (1955) multiple range test was used to compare the significant differences between means. Data were analyzed using SAS (2009).

## Results and Discussion

The results in Table (2) shown that treatments of adding Cr yeast had significant effects ($p<0.05$) on Weekly and total feed intake (gm) in experiment especially T4 whom shown negative effect on all period. The results in Table3 also shown the significant effects ($P<0.05$) of treatments of chromium yeast on Weekly weight (gm) and results on table4 the effect of Chromium yeast on Weekly feed conversation ratio whom shown the significant of them on control group.

This improvement in live body weight and feed conversion could be due to the increase in metabolic rate in birds that supplemented with chromium yeast, the chromium is an essential nutrient that effects glucose metabolism and works in the animal by promoting insulin activity and thus increasing glucose transport into cells. So the birds fed chromium were able to more effectively metabolism glucose, thus improving glucose clearance rates. Insulin activity enhances the ability of cells to absorb glucose from feed ingredients and convert it to energy that fuels protein synthesis, lean tissue growth and cellular maintenance (Hossain *et al.*, 1998). The effects of chromium yeast on Mean values for effect of chromium yeast dosage on carcass characteristics, offal's and organs expressed in % body weight show in table 5 and the significant effects($p<0.05$) were clearly especial on dressing carcass and other carcass parts. The beneficial effect of supplementing of chromium yeast on carcass and breast meat yield may be related to role in increasing amino acid uptake and utilization. Ultimately increase protein deposition, muscles synthesis and meat yield (Sahin *et al.,* 2002).

Table (2): Effect of chromium yeast on weekly and total feed intake (gm)

| Treatments | W3 | W4 | W5 | W6 | Total |
|---|---|---|---|---|---|
| T1 | 692±11 b | 1048±32 d | 1277±15 c | 1404±30 c | 4422±43 d |
| T2 | 691±13 b | 1200±23 c | 1310±21 b | 1425±34 bc | 4624±55 c |
| T3 | 697±11 b | 1223±34 b | 1353±22 a | 1463±27 b | 4727±25 b |
| T4 | 722±11 a | 1266±26 a | 1351±16 a | 1530±32 a | 4853±36 a |

$T_1$ = basal diet + 0 mg Cr yeast/kg diet, $T_2$ = basal diet + 0.5 mg Cr yeast/kg diet, $T_3$ = basal diet + 1 mg Cr yeast/kg diet, $T_4$= basal diet + 1.5 mg Cr yeast/kg diet.

Table (3): Effect of chromium yeast on weekly weight(gm)

| Treatments | Weekly weight(gm) | | | |
|---|---|---|---|---|
| | W3 | W4 | W5 | W6 |
| T1 | 818±11 b | 1365±23 C | 2012±43 d | 2713±54 d |
| T2 | 827±15 b | 1484±31 b | 2125±32 c | 2895±57 c |
| T3 | 826±14 b | 1481±21 b | 2186±35 b | 3000±54 b |
| T4 | 860±18 a | 1573±25 a | 2314±44 a | 3214±55 a |

$T_1$ = basal diet + 0 mg Cr yeast/kg diet, $T_2$ = basal diet + 0.5 mg Cr yeast/kg diet, $T_3$ = basal diet + 1 mg Cr yeast/kg diet, $T_{4=}$ basal diet + 1.5 mg Cr yeast/kg diet

Table (4): Effect of Chromium yeast on weekly feed conversation

| Treatments | Weekly and total feed conversation | | | |
|---|---|---|---|---|
| | W3 | W4 | W5 | W6 |
| T1 | 1.60±0.2 a | 1.89±0.3 b | 2.1±0.2 b | 1.9±0.1 c |
| T2 | 1.58±0.1 a | 1.84±0.3 ab | 1.86±0.1 a | 1.88±0.1 bc |
| T3 | 1.57±0.3 a | 1.82±0.2 ab | 1.88±0.1 a | 1.82±0.2 b |
| T4 | 1.55±0.2 a | 1.77±0.2 a | 1.81±0.2 a | 1.71±0.2 a |

$T_1$ = basal diet + 0 mg Cr yeast/kg diet, $T_2$ = basal diet + 0.5 mg Cr yeast/kg diet, $T_3$ = basal diet + 1 mg Cr yeast/kg diet, $T_{4=}$ basal diet + 1.5 mg Cr yeast/kg diet

Table (5): Mean values for effect of chromium yeast dosage on carcass characteristics, offal's and organs expressed in % body weight

| Characteristics | Treatments | | | |
|---|---|---|---|---|
| | T1 | T2 | T3 | T4 |
| Dressing carcass | 69.76±0.38b | 71.68±0.44a | 72.22±0.55a | 73.26±0.37a |
| Thigh | 15.12±0.32b | 17.11±0.11a | 17.32±0.25a | 18.11±0.23a |
| Drumstick | 11.21±0.02b | 14.22±0.04a | 14.77±0.05a | 15.92±0.03a |
| Breast | 23.12±0.33b | 26.76±0.45a | 27.22±0.34a | 28.77±0.23a |
| Liver | 2.33±0.03 | 2.21±0.06 | 2.65±0.04 | 2.11±0.03 |
| Gizzard | 2.11±0.05 | 2.22±0.07 | 2.21±0.08 | 2.33±0.06 |
| Heart | 0.67±0.03 | 0.60 ±0.05 | 0.55±0.04 | 0.51±0.03 |

$T_1$ = basal diet + 0 mg Cr yeast/kg diet, $T_2$ = basal diet + 0.5 mg Cr yeast/kg diet, $T_3$ = basal diet + 1 mg Cr yeast/kg diet, $T_{4=}$ basal diet + 1.5 mg Cr yeast/kg diet

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