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# EFFECT OF DIFFERENT LEVELS OF CHROMIUM YEAST ON PERFORMANCE AND SOME CARCASS CHARACTERISTICS OF LOCAL AWASSI LAMBS

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## ABSTRACT
An experiment was conducted to investigate the effects of different levels of chromium yeast on Awassi lambs performance and some carcasses characteristics. Eighteen Awassi lambs 4-5 months old of live body weight means 25±0.5 kg were used. Lambs were randomly divided into three equal groups fed on 3% live body weight concentrate , and wheat straw with chromium yeast supplemented treated diets (T1 ، T2 and T3) of levels of 0 ، 0.5 and 1 gm respectively. Results showed that the two levels of chromium yeast 0.5 and 1 gm wouldn't significantly affected the final weight , total weight gain, daily weight gain , total feed intake , feed conversion ratio , hot and cold carcass weight and dressing ratio . No significant differences were found for de-fated (fat tail, kidneys, pelvic, heart and mesenteric). Same result showed no significant differences in rib-eye area and fat thickness, as in physical separation group T1 showed significantly ($P<0.05$) higher in fat and bone weight ratio than T2 and T3 , whereas meat weight ratio in T2 and T3 was higher significantly than T1, whereas in chemical analysis groups T2 and T3 was significantly higher than T1 in protein percentage , On the other hand fat percentage in T1 significantly differ than that in other two groups , and same trend was showed significantly ($P<0.05$) effect on moisture percent in groups T3 than T1 and T2 . Group T3 was significantly ($P<0.05$) higher in weight ratio for shoulder cut than those in other groups whereas T1 was significantly ($P<0.05$) higher in weight ratio flank and neck cuts than other groups and T2 was significantly differ in shank weight ratio than other two groups.

**KEYWORDS:** chromium yeast, Awassi lambs, body weight, shank weight etc.

## INTRODUCTION
Since the fifties of the last century, Curran, (1954) demonstrate that trivalent chromium $Cr^{+3}$ have a role in glucose and cholesterol metabolism. Subsequently many other researchers proved the importance of chromium for human and animal nutrition and were considered as one of the essential trace elements exerts its biological function in terms of active components of the glucose tolerance factor GTF, Primarily by increasing sensitivity of insulin and by improving glucose metabolism (Anderson, 1998 & 1999). Recently Brautigan *et al*. (2006) and patter *et al*. (2006) demonstrated the involvement of chromium in lipids and cholesterol metabolism. Pollard *et al*. (2001) conducted many in vitro studies, demonstrating an improvement in protein synthesis by increasing amino acid uptake by bovine muscle cells from organic chromium supplemented steers. In a mean time glucose uptake rate was increased in muscle cell cultures. These results were reflected an increased carcass muscling in ruminants fed organic chromium supplemented diets. Now a day's, people and breeders prefer lean meat with less fat rather than fatty meat. Genetic selection and different dietary regimes were conducted and led to tremendous improvement in the efficiency of animal production and carcass traits. Chromium with its proved essentially in glucose lipids and cholesterol metabolism may have an important role to improve carcass traits in lambs. The present work was designed to demonstrate the effect of organic chromium (chromium yeast) on lamb's performance and some carcass characteristics.

## MATERIALS & METHODS
Eighteen 4-5 months- old local Awassi breed lambs with mean initial body weight of 25±0.5 kg were used in this experiment, which was conducted in Agriculture College – Tikrit University farm during the period 15 June 2012 to 1 October 2012. Lambs were subjected to 2 weeks preliminary period of acclimatization and adaptation to the ration in which the lambs were vaccinated against internal parasite by Bendazole and for both internal and external parasite by Ivermectin and also vaccinated against foot and mouth disease and enterotoxaemia.

**TABLE 1**: chemical composition for ratio

| Feed stuff ingredients with percentages | |
|---|---|
| Yellow corn | 10% |
| Wheat grain | 30% |
| Barley | 35% |
| Flour | 13% |
| Soya bean | 10% |
| Minerals & Vitamins | 2% |

Thereafter lambs were randomly assigned into three groups 6 lambs each (control, treatments 1 and 2) with two subgroups of three lams each as a replicate. Lambs were housed in three separate pens 6×5 m. with concrete floor supplied with two feedlots for each concentrate and wheat straw. Two blocks of mixed minerals were placed in each pen, water was freely accessed. Group feeding system was applied. Chemical composition of the ration was formulated from the following feedstuffs with its proximate analysis as given in tables (1, 2).

**TABLE 2**: Proximate analysis for the ration

| Ingredients | DM | CP | Fat | CF | Ash. | Cal .NFE |
|---|---|---|---|---|---|---|
| Concentrate mix | 84.86 | 12.54 | 2.41 | 2.59 | 2.15 | 67.11 |
| Wheat straw | 87.2 | 3.0 | 1.72 | 34.23 | 4.62 | 43.73 |

Data were subjected to one-way analysis of variance (ANOVA) using statistical program, SAS (2004).

Concentrate feed was daily estimated and weighted and offered at 3% of the live body weight at 8 o'clock in the morning and the residual ration were weighted next day to estimate daily feed intake . control group were kept on ration alone, treatment 1 were administrated orally with 0.5 g chromium yeast capsule daily pre-feeding and treatment 2 were administrated orally with 1g chromium yeast capsules pre-morning feeding. Chromium yeast was imported from China Angel yeast Co.ltd. At the end of experimental period which lasted for 75 days. Lambs were slaughtered after removal of the ration for 12hours before slaughtering. After slaughtering and skinning and eviscerated the internal organs the hot weight of the carcass was recorded and kept at 4C˚for 12 hours after that the cold carcass was recorded. Other criteria rib eye area (transfers section of the longismus dorsi muscle between the twelfth and thirteen ribs was recorded using planometer type Topcon kp-92n. fat thickness was recorded using digital caliper . Carcasses were divided into two equal part left and right using electrical saw, the right one were cut into eight cuts, leg, shoulder, rib, loin, breast, foreshank, neck and flank according to Forrest, (1975). Ribs cuts were physically separated into lean, fat and bone. Lean and fat were minced and thoroughly mixed. Samples from this mixture were analyzed for proximal analysis to estimate the percentages of protein, fat, moisture and ash according to Jones *et al*. (1983).

## RESULTS & DISCUSSION

Results showed no statistical effect of chromium yeast supplementation on initial and final body weight, total body gain, total daily gain, feed intake, feed conversion ratio, hot and cold carcass weight and dressing percentage as shown in table (3).

**TABLE 3:** The effect of adding different levels of Chromium yeast on performance and some carcass characteristics of Awassi lambs

| Treatments | T1 | T2 | T3 |
|---|---|---|---|
| Initial body weight (Kg) | 25.650 ± 1.357 | 25.433 ± 0.863 | 25.333 ± 1.153 |
| Final body weight ( Kg ) | 41.750 ± 1.243 | 41.250 ± 2.144 | 39.550 ± 1.017 |
| Total weight gain (Kg) | 16.100 ± 2.091 | 15.871 ± 1.389 | 14.217 ± 0.800 |
| Daily weight gain ( gm ) | 230 ± 0.029 | 225 ± 0.019 | 203 ± 0.011 |
| Total feed intake (Kg) | 415 ± 30.55 | 396 ± 41.33 | 395.5 ± 35.77 |
| Feed conversion kg/Kg | 4.29 ± 0.24 | 4.17 ± 0.15 | 4.63 ± 0.20 |
| Hot weight (kg) | 20.155 ± 0.897 | 19.840 ± 1.329 | 19.345 ± 0.615 |
| Cold weight (kg) | 19.328 ± 0.678 | 19.063 ± 1.189 | 18.467 ± 0.695 |
| Dressing Ratio % | 48.189 ± 0.917 | 47.903 ± 1.038 | 48.906 ± 0.903 |

*No significant differences.

However our experimental design and the number of experimental animals may not have been enough sufficient to detect statistical differences in the above mentioned criteria, same results were reported by other researchers (Bunting *et al*., 1994, Kitchalong *et al*., 1995 and Swanson *et al*., 2000 ) who have supplemented calves or lambs with organic chromium, their results revealed that, although the total feed intake was lowered in chromium yeast fed lambs as compared with control group but the difference was not statistically significant. Same trend was observed in the feed conversion ratio in the favor of the lambs supplemented with chromium yeast. These results were in agreement with results reported elsewhere. (kitchalong *et al.,* 1995 , domingues *et al*., 2009 ) . No statistical differences were observed in the defatted tissue, table (4)

**TABLE 4:** The effect of adding different levels of Chromium yeast on defatted tissues of Awassi lambs

| Treatments | T1 | T2 | T3 |
|---|---|---|---|
| Fat tail (kg) | 2.951 ± 0.309 | 2.805 ± 0.396 | 2.773 ± 0.299 |
| Kidneys and Pelvic (kg) | 0.205 ± 0.040 | 0.151 ± 0.016 | 0.190 ± 0.024 |
| Heart (kg) | 0.106 ± 0.048 | 0.061 ± 0.004 | 0.060 ± 0.005 |
| Rumen (kg) | 0.282 ± 0.033 | 0.206 ± 0.038 | 0.162 ± 0.043 |

No significant differences

Chromium yeast supplemented ration lambs showed lower defatted tissue, these results may be attributed to the number of the experimental animal (Swanson *et al*., 2000). Rib-eye area and fat thickness showed no significant differences among the three groups (table 5). Whereas the physical separations of the Rack cut showed significantly higher ratios of lean in group T2 followed by group T3,while the fat ratio were higher in T1 followed by T2. T3 recorded a lowest value as shown in table (6).

**TABLE 5:** The effect of adding different levels of Chromium yeast on rib eye area and fat thickness of Awassi lambs

| Treatment | T1 | T2 | T3 |
|---|---|---|---|
| Rib eye area (cm²) | 14.500 ± 0.891 | 16.267 ± 1.688 | 14.700 ± 1.381 |
| Fat thickness ( mm) | 6.980 ± 0.540 | 6.811 ± 0.513 | 6.795 ± 0.523 |

No significant differences

**TABLE 6:** The effect of adding different levels of Chromium yeast on physically separated dissected (meat , fat and bone ) ratios of Awassi lambs

| Treatments | T1 | T2 | T3 |
|---|---|---|---|
| Meat % | 48.680 ± 0.048 b | 53.905 ± 1.598 a | 53.308 ± 1.046 a |
| Fat % | 26.568 ± 0.131 a | 24.415 ± 0.885 b | 24.195 ± 0.724 b |
| Bone % | 24.728 ± 0.087 a | 21.668 ± 0.859 b | 22.420 ± 0.417 b |

*Significant ($P < 0.05$ )

Bone weight ratio were higher inT1 followed by T2,and T3 was the lowest . these results were in agreement with results reported by (Xiaogang *et al*., 2008) .These differences can be attributed to the expected effect of chrome on carbohydrate , lipid and protein metabolism (Debski *et al*., 2004). Pollard *et al.* (2001) indicated that the organic form of chrome as a feed additives which is capable for alteration the body components, increased the protein content and muscling. Results in table (7) shows significant ($P \leq 0.05$) differences in the proximal analysis of the rack cut were the means of the protein percentage were higher in lambs fed Chromium yeast in T2 andT3 as compared with T1.

**TABLE 7:** The effect of adding different levels of Chromium yeast on rack cut of Awassi lambs

| Treatments | T1 | T2 | T3 |
|---|---|---|---|
| Protein % | 16.223 ± 0.180 b | 17.630 ± 0.190 a | 17.611 ± 0.131 a |
| Fat % | 25.306 ± 0.295 a | 23.281 ± 0.183 b | 22.935 ± 0.244 b |
| Moisture % | 56.100 ± 0.478 b | 57.145 ± 0.355 ab | 57.761 ± 0.164 a |
| Ash % | 1.503 ± 0.076 a | 1.531 ± 0.019 a | 1.598 ± 0.019 a |

*Significant differences ($P < 0.05$ )

Means percentage of the fat were lower in T2 and T3 as compared with T1, whereas the percentage of the moisture content in Rack cut in T1 was lower than that in other treated groups, this was expected since the protein contents was positively correlated with moisture, whereas negatively correlated with fat content (Price and Schweigert, 1971). Table (8) showed no significant differences among the three groups in the prime and course cuts of the carcasses, these results are in agreement with those results obtained earlier by Bunting *et al*. (1994), Swanson *et al*. (2000) and Domingues *et al.* (2009) who attributed that to the experimental design and the number of the experimental animals, although it may be due to an expecting cutting errors, as it seen in the shoulder cut in group T2 that showed lower ratio as compared with T3, whereas no significant differences showed in group T1. Whereas in the course cuts (flank and shank) ratio in T2 showed higher as compared with T1 and T3. General conclusion from the present work demonstrate that the effect of chromium on fat deposition in the carcasses may be that due to the modulation effects in glucose and insulin metabolism ( Xiaogang *et al.,* 2010, Mathew *et al.,* 2001), or it may refer to the positive effect on protein anabolism (Bernao *et al*., 2004) as shown in table (8) .

**TABLE 8:** The effect of adding different levels of Chromium yeast weight ratio for prime and course cuts of Awassi lambs

| Treatment | T1 | T2 | T3 |
|---|---|---|---|
| Loin % | 3.605 ± 0.247 a | 3.843 ± 0.529 a | 3.023 ± 0.236 a |
| Leg % | 14.654 ± 0.477 a | 14.117 ± 0.329 a | 15.225 ± 0.542 a |
| Ribs % | 2.921 ± 0.188 a | 2.661± 0.222 a | 2.756 ± 0.079 a |
| Shoulder % | 9.537 ± 0.365 ab | 7.789 ± 0.539 b | 11.453 ± 1.048 a |
| Flank % | 2.101 ± 0.216 a | 1.779 ± 0.155 ab | 1.434 ± 0.130 b |
| Breast % | 5.337 ± 0.430 a | 4.912 ± 0.305 a | 4.988 ± 0.229 a |
| Neck % | 4.560 ± 0.111 a | 4.041 ± 0.178 b | 3.853 ± 1.194 b |
| Shank % | 3.129 ± 0.165 b | 3.823 ± 0.247 a | 3.217 ± 0.145 b |

*Significant ($P < 0.05$)

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