WORLD JOURNAL OF PHARMACY AND PHARMACEUTICAL SCIENCES
SJIF Impact Factor 6.041
Volume 5, Issue 4, 360-365 Research Article ISSN 2278 – 4357

# EFFECT OF WATERMELON SEED CAKE IN BROILER CHICKEN PERFORMANCE

**Issam Sir Elkhatim Ibrahim[1] and Mukhtar Ahmed Mukhtar[2*]**

[1,2]Department of Animal Production, College of Agriculture Studies, Sudan University of Science and Technology, Khartoum North, Shambat, P.O. Box 407, Sudan.

Article Received on
29 Jan 2016,
Revised on 22 Feb 2016,
Accepted on 14 Mar 2016
DOI: 10.20959/wjpps20164-6169

***Correspondence for Author**
**Mukhtar Ahmed Mukhtar**
Department of Animal Production, College of Agriculture Studies, Sudan University of Science and Technology, Khartoum North, Shambat, P.O. Box 407, Sudan.

## ABSTRACT

This experiment was carried out to study the effect of raw watermelon seedcake or treated on the performance, the apparent protein retention and apparent digestibility of dry matter and fat. One-hundred and fifty-one day old, unsexed broiler chicks were divided into five experimental diets (A, B, C, D and E). Chicks of group A fed on control group, chicks on groups B and C were fed on diets supplemented with 15 and 20% watermelon seed cake (WMSC), respectively; while diets D and E were supplemented with 15 and 20% toasted watermelon seed cake (TWMSC), respectively. Results obtained revealed that, inclusion of WMSC at 20% improved the performance and carcass attributes compared to control group. Chicks fed on toasted watermelon seed cake recorded better performance than those fed untoasted.

**KEYWORDS:** WMSC, TWMSC.

## INTRODUCTION

Sudan is considered as the country of origin for watermelon, especially in Kordofan, where watermelon grows as a wild plant (Gokovsky, 1971). Water-melon (*Citrulus vulgari*, Schard) is a creeping annual cash crop; it is utilized as summer fruit (Gohl, 1981). The seed cake is used as a protein-supplement for livestock (Amani and Salih, 2009). Seed cake contained 25.4% CP, 27.4% CF, 7.84% EE, 2.7% ash and 95.5% DM (Mustafa and Alamin, 2011; Oyenuga and Fetuga, 1975) found that the WMSC contained 3.68 g/100 gm lysine, 1.94 g/100 gm methionine and 2.71 mg/100 gm tryptophan. The present study was conducted to evaluate feeding two levels of WMSC and the same levels of toasted WMSC on the

performance, carcass characteristics, apparent protein retention and apparent digestibility of crude protein and fat for broiler chicks.

## MATERIALS AND METHODS

Watermelon seeds were purchased from the local market, divided into equal two categories. One left at it is, the second part toasted at 112°C for 7 minutes. The two categories were separately grinded mechanically to extract oil, the seed cake each was used after determination of each chemical composition according to AOAC (1990).

Five dietary treatments were formulated as: diet A used as a control (groundnut based diet), diets B and C were supplemented with 15 and 20% raw watermelon seed cake, respectively; while diets D and E were supplemented with 15 and 20% toasted watermelon seed cake (TWMSC), respectively (table, 1. One-hundred and fifty, unsexed, one day old broiler chicks (Lohman) were randomly divided into five groups each group was also subdivided into three replicates with 10 chicks per each replicate. Chicks were allocated to one of the dietary treatments in a completely randomized block design, and reared in an open system under the optimum environmental conditions. Feed and water provided *ad libitum*. Chicks in all groups were vaccinated against Gumboro and Newcastle diseases.

At 21 day old, the apparent digestibility was determined according to the following formulas:

$$\text{Apparent digestibility of DM} = \frac{\text{DM consumed-DM in feces}}{\text{DM consumed}} \times 100$$

$$\text{Apparent digestibility of fat} = \frac{\text{Total fat consumed-total fat in feces}}{\text{Total fat consumed}} \times 100$$

$$\text{Protein retention} = \frac{\text{Total protein consumed-total protein in feces}}{\text{Total protein consumed}} \times 100$$

At the end of the experiment, one bird from each replicate was randomly selected. They were slaughtered and eviscerated. The legs were cut and deboned for panel test.

Data obtained were subjected to analysis of variance (Steel and Torrie, 1960). Treatment means were compared according to Duncan's new multiple range tests (1955).

**Table (1): Composition and determined of experimental diets.**

| Component | Control | WMSC | | Toasted WMSC | |
|---|---|---|---|---|---|
| | | 15% | 20% | 15% | 20% |
| **Dura** | 63.0 | 63.0 | 63.0 | 63.0 | 63.0 |
| **Groundnut cake** | 26.0 | 11.0 | 6.0 | 11.0 | 6.0 |
| **Concentrate** | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| **Wheat bran** | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| **Lime stone** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **Salt** | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |

**Determined**

| Parameter | Control | WMSC | | Toasted WMSC | |
|---|---|---|---|---|---|
| | | 15% | 20% | 15% | 20% |
| **DM** | 92.6 | 92.6 | 92.6 | 93.6 | 92.6 |
| **EE** | 3.7 | 4.26 | 4.62 | 5.18 | 5.24 |
| **CP** | 23.15 | 22.3 | 22.2 | 22.87 | 23.28 |
| **CF** | 3.68 | 6.92 | 6.82 | 6.12 | 6.98 |
| **Ash** | 7.98 | 8.09 | 6.29 | 7.69 | 6.03 |
| **NFE** | 58.41 | 55.11 | 56.69 | 53.28 | 52.66 |

## RESULTS

Chemical analyses of toasted WMSC (Table 2) showed an increase in DM, CP, EE, CF, NFE and ME compared with untreated WMSC by 3.46%, 31.8%, 17.39%, 15.895, 24.49% and 20.47%, respectively.

**Table (2): Chemical analysis of WMSC.**

| Parameter | WMSC | Toasted WMSC |
|---|---|---|
| **DM** | 92.5 | 95.7 |
| **CP** | 20.62 | 27.18 |
| **EE** | 9.2 | 10.8 |
| **CF** | 21.4 | 24.8 |
| **Ash** | 12.7 | 7.3 |
| **NFE** | 20.56 | 25.62 |
| **ME Mj/kg** | 8.5 | 10.24 |

Results of performance showed no significant (P>0.05) difference between tested groups in feed intake and feed conversion ratio, although group fed on 15% untreated WMSC consumed more feed compared to all tested groups (Table, 3). Chicks fed on toasted WMSC recorded significantly the lowest (P>0.05) weight gain compared to those fed on 20% toasted WMSC. All experimental groups showed no significant (P>0.05) difference in feed conversion ratio.

Non-carcass components, dressing percentages and meat/bone ratio revealed no significant difference (P>0.05) between tested groups (table, 4).

Results obtained for retained protein showed significant decrease (P<0.05) for chicks fed 20% toasted WMSC compared to control group. Apparent digestibility of dry matter and fat results showed no significant (P>0.05) difference among tested groups (table5).

Subjective meat attributes of experimental groups showed no significant (P>0.05) difference in flavor, juiciness, color and tenderness, although chicks fed on 20% untreated WMSC showed significant (P<0.05) decrease in color compared to other tested groups.

**Table (3): Performance.**

| Parameter | Control | WMSC | | Toasted WMSC | | SE± |
|---|---|---|---|---|---|---|
| | | 15% | 20% | 15% | 20% | |
| **Feed intake** | 3400.7$^{a}$ | 3542.4$^{a}$ | 3180.8$^{a}$ | 3162.9$^{a}$ | 3484.2$^{a}$ | 462.87 |
| **Final weight** | 1750.0$^{a}$ | 1661.3$^{ab}$ | 1699.3$^{ab}$ | 1543.0$^{b}$ | 1831.0$^{a}$ | 210.21 |
| **Weight gain** | 1705.5$^{a}$ | 1617.3$^{ab}$ | 1655.8$^{ab}$ | 1500.0$^{b}$ | 1788.5$^{a}$ | 208.99 |
| **FCR** | 2.63$^{a}$ | 2.64$^{a}$ | 2.53$^{a}$ | 2.8$^{a}$ | 2.53$^{a}$ | 0.08 |

**Table (4).**

| Parameter | Control | WMSC | | Toasted WMSC | | SE± |
|---|---|---|---|---|---|---|
| | | 15% | 20% | 15% | 20% | |
| **Prot. conv. ratio** | 2.13 | 2.05 | 2.24 | 2.3 | 2.3 | 0.45 |
| **Dressing %** | 89.22 | 88.21 | 85.62 | 84.93 | 84.93 | 27.86 |
| **Retained protein** | 73.13$^{a}$ | 66.63$^{ab}$ | 71.83$^{a}$ | 72.73$^{a}$ | 62.15$^{b}$ | 34.56 |
| **EE digest** | 97.56$^{a}$ | 97.21$^{a}$ | 97.13$^{a}$ | 93.4$^{a}$ | 96.46$^{a}$ | 1.43 |
| **DM app. dig.** | 78.46$^{a}$ | 78.42$^{a}$ | 77.09$^{a}$ | 78.57$^{a}$ | 77.97$^{a}$ | 23.28 |

**Table (5): Feces chemical analysis.**

| Parameter | Control | WMSC | | Toasted WMSC | |
|---|---|---|---|---|---|
| | | 15% | 20% | 15% | 20% |
| **DM** | 73.26 | 73.66 | 22.32 | 72.02 | 73.92 |
| **Nitrogen** | 0.22 | 0.18 | 0.19 | 0.19 | 0.16 |
| **CP** | 1.36 | 1.11 | 1.16 | 1.19 | 1.0 |
| **EE** | 0.53 | 0.79 | 0.81 | 0.63 | 0.68 |
| **CF** | 17.5 | 22.75 | 22.5 | 24.5 | 24.5 |
| **Ash** | 3.94 | 5.05 | 5.21 | 4.53 | 3.96 |
| **NFE** | 49.93 | 43.97 | 41.84 | 41.17 | 43.78 |

## DISCUSSION

Chemical composition of raw and toasted WMSC presented in Table (?) indicated increase in CP, CP, EE, ash, NFE and ME percentages of toasted WMSC, this might be due to that

toasting of seed, which increase the DM of seed, at the same time, increase in CP. However, results of untreated WMSC were in line with the finding of (Hayat, 1994 and Rajab, 2002).

The mortality rate was low and not influenced by the dietary treatments, which could be due to good sanitation and proper environmental condition. Results showed an increase in feed intake and body weight for chicks fed on 20% toasted WMSC compared to other tested groups, this may be due to that toasting increase the palatability, the result was agreed with that obtained by Ishtiaq, (1992) and Sawaya et al., (1986), who found that using of unprocessed meal depressed growth and feed efficiency. The feed intake increased at 15% WMS meal, this in line with results reported by Hisham (2004) and Shazali etal., (2013), but not agreed with that obtained by Nwukolo and Sim (1987),who found a significant depression in average feed consumption but better in FCR for chicks fed water melon meal compared to chicks fed soybean meal.

Results obtained for retained protein in feces showed that chicks fed 20% toasted WMSC reduced compared to other tested groups, this means that chicks or due to that treating of protein by heat increase its digestibility. These results were in agreement with that obtained by Campbell *et al*. (1969).

Toasting of WMSC improved DM and fat digestibility; this might be due to heat treatment or oil extraction, which increases their digestibilities, result was in line with finding of Ishtiaq, (1992). This experiment revealed that, WMSC can be included in broiler diets up to 20% and replace plant protein sources after toasting.

**REFERENCES**

1. Ahmed, I.E. Inclusion of Water Melon Seed Meal in Broiler Rations. MSc thesis, Islamic University of Omdurman, Sudan., 1998.
2. Amani, A. Beshir and Salih, A. B. The effect of subistitution of groundnut cake by water melon seed cake (Citrullus Lanatus) in ration for lamb fattening in Sudan. Research Journal of Agriculture and Biological Sciences, 2009; 5(6): 1130-1142.
3. AOAC. Official Methods of Analysis. Vol. I. 15th Ed. Association of Official Analytical Chemists, Arlington, VA., 1990.
4. Oyenuga, V.A. and B.L. Fetuga. Some aspects of the biochemistry and nutritive value of the watermelon seed (*Citrullus vulgaris* schrad). J. Sci. Food Agric., 1975; 26: 843-846.
5. Campbell, L.D. and Marquardlt, R. R. Poultry Science, 1977; 56: 442.

6. Duncan, D.B. Multiple range and multiple F-tests. Biometrics., 1955.
7. Hayat A.R. Functional properties of water melon seed protein isolate. MS. Thesis. Univ. Khartoum, Sudan., 1994; 11: 1-42.
8. Hisham, S.S.A. Evaluation of watermelon seed meal as feed for poultry .A thesis submitted in fulfillment of the requirements for the degree of Doctor of Philosophy. Faculty of Animal Production University of Khartoum., 2004.
9. Gohl, B. Tropical Feeds. Feed information summaries and nutritive value. FAO Animal Production and Health Series, 1981; 12: 238.
10. Gokovsky, T.M. (1971). Koltornie-rastenia-E-IKH-sorodichy. Sarce publication. Koloc Leingral., 1971; 620-627.
11. Ishtiaq, A. Nutrition value of watermelon seed cake in feeding broiler chicks. MSc. Theses. Omdorman Islamic University, Sudan., 1992.
12. Mustafa, A.B. and A.A.M. Alamin, Chemical Composition and Protein Degradability of Watermelon (*Citrullus lanatus*) Seeds Cake grown in Western Sudan. *Asian Journal of Animal Sciences, 2012; 6: 33-37.*
13. Nwokolo E. and Sim J.S. Nutritional assessment of defat-ted oil meals of watermelon (*Colocynthesis citrullus*) fluted pumpkins (Telfaria occidentalis hork) by chick assay. *J. Sci. Food Agric*., 1987; 38: 237-246.
14. Rajab H.I. Nutritional value of full fat watermelon seed for broiler chicken. MSc. Thesis. University of Khartoum, Su-dan., 2002.
15. Sawaya, W. N.; Dghir, N.J. and Khalil, J. K. Citrullus colocynthis seed as a potential source of protein for seed. J. Agric. Food Chem., 1986; 34: 285-288.
16. Shazali, H.S., E.A. El-Zubeirand O. M. A. Abdelhadi. The Effects of Feeding Watermelon Seed Meal and Full Fat Seed on Broiler Chicks Growth. Iranian Journal of Applied Animal Science., 2013; 3(2): 279-282.
17. Steel R.G.O. and Torrie J.H. Principles and Procedures of Statistics: A Biometrical Approach. MC Grow Hill Book Co., New York., 1960.