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Using of Sugar Cane Molasses in Broiler Chickens Production

Elsiddig, A.E.A. [1]; Elobeid, E.A.E.[1*]; Abdelbagi,A. A. A., [2] and Amin, A.E. [3]

[1]Department of Poultry Production, Faculty of Agriculture, Omdurman Islamic University, Sudan.

[2]Department of Crop Production, Faculty of Agriculture Omdurman Islamic University, Sudan

[3]Department of Pharmacology and Toxicology, Faculty of Veterinary Medicine, University of Khartoum, Sudan.

Email address:

Elobeid1954@gmail.com, *Corresponding author

Abstract: The study was conducted to show the effect of feeding graded levels of sugar cane molasses meal on the growth performance of (112) unsexed broiler chicks of Ross 308 strain,after the end of second week -old were used complete randomize dozen allotted to four treatments in a 4x4x7 arrangement. Four experimental broiler rations, semi-isocalaric semi-isonitrogenous were formulated with ascending levels of sugar cane molasses meal wise as 0, 5, 7.5 and 10% and designated as rations A, B, C and D respectively with ration A serving as the control. Experimental feeding was continued for35 days on *ad-libitum* basis, allowing for an initial adaptation feeding period for one week 0n pre-starter ration. Second week on control diet before feeding on the experimental rations during all experiment period. Data collected included weekly feed intake (g), body weight gain (g) and calculated feed conversion ratio during the experiment period and at the end of the experiment 8 birds from each group were selected randomly weight and slaughtered for carcass characteristics and dressing percentage and the weight of internal and external parts and measurement the length of intestines and coloca . The final productive performance live weight, feed intake weight gain, carcass weight which showed significant different ($P<0.05$) during the experiment period. The internal parts showed no significant different ($P<0.05$) and also in the internal organs and weight of liver, heart, and gizzard and the length of large and small intestine. According to the results of this study you can used of sugar cane molasses meal up the 10% in the content of the diet without any side effect on the productive performance of the broiler chicks.

Keywords: Sugar Cane; Molasses; Broiler; Chickens; Production

Introduction

The rise in poultry production and consumption in Sudan generally and in Khartoum State particularly may be attributed to many precipitating reasons including, increased broiler farming in Sudan has emerged as the fastest growing segment of animal husbandry. However, the profitability of a broiler industry largely depends on the selection of superior commercial strains of broilers quality, economics of feeding, adoption of sound managerial practices and efficient marketing system. Khartoum State ranks first in broiler production in Sudan; it produces about 90% of the total broiler production country wise (Wagge Allah, 2011).The energy sources were the one major challenge encountered by poultry farmers are cost of feed all over the world. In Sudan the major traditional sources of energy was the sorghum which succeed in substituting part of the cereal grains by cane sugar molasses, this will minimize the cost of poultry ration and will consequently reduce the price of poultry products if molasses was fed in high level to poultry. Sorghum added to the content of the feed by 66to 68 percentage of the total feed components of the laying hens (Elobeid, 1998). Also the high total cost in the poultry production was the feed which account about 60- 70%0fthe total cost of the feed production in the broiler chicks (Ahmed, 2013). Sugar cane is also widely grown in Sudan as a raw material for a strategic and expanding national sugar industry. This has been accompanied by substantial amounts of cane molasses produced cheaply as a by-product of sugar production. Molasses can be a source of quick energy and an excellent source of minerals for farm animals and even Humans. Molasses can also be a key ingredient for cost effective management of feeds and pastures (Milton, 2012).

Sector of sugar industries in the Sudan which part of successes over a large and big scale associating the agricultural industries which feedback to about 50 years and the estimated production of molasses as project industry about 600000 tons per year according to the Sudan sugar company (Kinana ,2009). (Azaher ,2015) concluded that the molasses (source of energy) is relatively a cheap energy source of high nutritive value than can be included in broiler ration for both safety and lowering the cost but the level of molasses inclusion is usually limited because of the risk of soft feces or diarrhea which has been related to high level of potassium and Sodium. Molasses is considered one of energy sources in Sudan, which is available in sufficient amount, with low prices, compared to sorghum; it has not been yet used extensively in poultry ration. According to Presten (1987, 1988) and Ly (1987a), molasses and sugar cane juice are characterized by their extremely high NFE value, and no fiber, and negligible amount of ether extract and protein. All types of molasses contain a small quantity of crude protein (3% in mineral soil reaching 10% in organic soil) (Champman *et.al*., 1965). Also the nitrogenous material in molasses consists mainly of non- protein nitrogen compounds (amides, albuminoids, amino acids and other simple nitrogenous compounds).These two factors limit its nutritional value for non- ruminants. Since feed constitutes the major cost item in the world poultry production, considerable research efforts have been spent to reduce its cost by using cheap locally available feed sources. This requires investigating the feeding value of the local ingredients and assessing their ability to supply nutrients, in available form, to meet the nutrients requirements for the different classes of poultry stock. Cereal grains are being utilized as a major energy source in poultry diets, beside their role as a staple food for humans .This resulted in a very sharp competition between human and monogastrics for cereal grains. This situation called for extensive research to find new feed resources for animal feeds to avoid this competition for cereal grains (Lyj, 1990, Shymaa, 2017) It is to be concluded that, the increase in the average feed intake and mean weight gain of broiler indicated that the diets were adequate to promote growth and improve feed efficiency of the Broiler chicken. In Sudan sorghum grain is widely grown and used for human consumption beside its use as a major source of energy in animal feeds .It becomes, therefore, strategically important to find new sources of energy for animal feeding ,in order to save sorghum and other cereal grains for human consumption . Sugar cane is also widely grown in Sudan as a raw material for a strategic and expanding national sugar industry. This has been accompanied by substantial amounts of cane molasses produced cheaply as a by-product of sugar production. Sugar cane molasses is capable of yielding greater quantities of soluble carbohydrate which can be used as a source of energy in poultry diets (Woldroup, 1981). Molasses is considered one of energy sources in Sudan, which is available in sufficient amount, with low prices, compared to sorghum; it has not been yet used extensively in poultry ration. Little work has been reported on the effects of feeding molasses on the poultry performance (Ricci *et.al.,* 1980). The resulted of used molasses in the broiler chickens by (Hajer, 2007) indicated a significant ($P<0.01$) increase in feed consumption, body weight gain and feed conversion ratio with increased incorporation of dietary molasses. Abdominal fat was similarly increased, but other carcass parameters and blood glucose level were not affected.

Therefore, the objective of this research was to determine the effect of feeding graded levels of molasses sugar cane in the diet on the performance of broiler chickens. This is hoped to yield and produces some useful information for the use of molasses as a source of energy in broiler diets.

Material and Methods:

The experiment was carried out in the Poultry Farm, Faculty of Agriculture, Omdurman Islamic University. Omdurman, Khartoum State, Sudan, during the period February 1th. up to May 19th 2015.Before that 7 days for acclimatization and the degree of temperature between20-23m .

Preparation of molasses:

Table1. Proximate chemical analysis (dry matter basis) of **molasses** .

Component	%
Dry matter	76.9
Crude protein	10.1
Ash	8.6
Nitrogen free extract	58.2
Energy Mj/kg	1.738
Energy Kcal/kg *	1355.64
Energy Kcal/kg*2.513	

Energy calculated according to the *(Lodhi *et al*.,1976).

molasses was produced from Asalia Sugar company keen and free from the others material kept in plastic bag until used in the diets. After diets formulation the molasses mixed with the diets and sprat on flat cloths until the dryness took place under shade in an aerated condition for 3-4 days. Then the diets milled electrically and the diets powder was kept in polythene bags to protect from light and humidity until used. Molasses was proximately analyzed (Table 1)**.**

Experimental ration:

Other experimental components used in this study preaches from -Omdurman market. Ration formulation of experiment diets according to the NRC. (1994). Feeding trails was a completely randomized design consisting of four dietary treatments semi –

Table 2. Percent inclusion rates of components (fresh basis) and proximate chemical composition (dry matter basis) of experimental broiler rations.

Ingredients	A	B	C	D
Sorghum	60	59	58.4	57.5
Groundnut cake	21.3	21.3	21.3	21.3
Sesame cake	8.85	8.85	8.85	8.85
Molasses	0	5	7.5	10
Wheat bran	3.9	2.9	1.5	0.4
Di ca	0.5	0.5	0.5	0.5
Lyme stone	1	1	1	1
Nacl	0.25	0.25	0.25	0.25
Lysine	0.1	0.1	0.1	0.1
Total	100	100	100	100
Components				
Crude protein	22.3	22.1	21.9	21.07
Ether extract	3.3	3.2	3	2.8
Fiber	5.1	5	4.9	4.8
Ash	5.9	6.2	6.5	7.2
Ca	1.2	1.2	1.2	1.2
P	0.48	0.48	0.47	0.47
Lysine	1.26	1.25	1.25	1.25
methionine	0.49	0.49	0.48	0.48
EnergymJ/kg*	13.12	13.24	12.94	13.1

*(Lodhi *et al.*,1976).

Chick of experiment:-

A total of 112 Ross day old unsexed chicks were randomly distributed into 4 groups of 28chicks. Each group was further subdivided into 4 replicates with 7 chicks per each. The chicks of each replicate were housed in a pen (1 square meter) in an open fine wire mesh sided poultry house on concrete floor, deep litter with the roof of metal sheets. Four (treatments A, B, C and D) with level of molasses 0.0,5,7.5 and 10 % were fed during the experiments period. Light continued throughout the experiment period, feed and water were offered *ad-libitum.* The temperature control by the observation of the chick's behavior during the day. In the first week the chick feeding on pre –starter and using the control diet for the second week and feeding experimental diets from beginning of the third week. All chicks vaccinated against Gymboree and Newcastle diseases on week and 15 day respectively. Added vitamins to the water throughout the first 5 day and before and after vaccination temperature between 20- 23′.

Experiment data collection:-

Performance values of experiment birds weekly calculated, as chicks life weight gain (g) feed intake (g) and calculated FCR, accepted weight, and mortality rate for experiment groups. At the end of experiment birds overnight fast(except for water) two birds randomly selected from each replicate after weighing and slaughter according to the Islamic procedure to assess the impact (molasses) inclusion in the diet on performance and carcass characteristics. Slaughter birds washed and then placed on cold snow water to be cold enough. Parts weight separately and recorded were expressed as % of the live weight.

Data analysis:-

Data on the performance and carcass characteristics analysis (ANOVA) and compare mean according Duncan (1955) multiple range test and Snedecor and Cochran (1989).

3. Results:

3.1 Effect of application of Molasses on the performance of broiler:

3.1.1 Effect on feed intake (g):

Table2 shows that mean of feed intake was significantly higher in control (3628.0 g/bird) and 5.0% Molasses treatment (3663.0 g/bird) than that in 7.5% and 10.0% Molasses treatments (2833.0 and 2613.0 g/bird, respectively.). The percentage of increasing in feed intake was estimated by about 28.1% and 38.8% for control as compared to 7.5% and 10.0% treatments, respectively and by about 29.3% and 40.2% for 5.0% as compared to 7.5% and 10.0% of molasses treatments. On the other hand, no significant differences between the control and 5.0% and between 7.5% and 10.0% treatments.

3.1.2 Body weight (g):

Table2 shows that application of either 5.0% or 7.5% Molasses to broiler ration significantly increased body weight(2430.7 and 2516.3 g/bird, respectively) as

compared to control (2198.3g/bird), with an increasing estimated by about 10.6% and 14.5% for 5.% and 7.5% treatments as compared to control. On the other hand, there was no significant difference between 10.0% Molasses treatment and the control, and also between 5.0% and 10.0%, whereas the difference between 7.5% and 10.0% was significant.

3.1.3 Body weight gain (g):

The significantly higher mean body weight gain was obtained by both 5.0% (590.5 g/bird) and 7.5% (565.6 g/bird) as compared to10.0% (432.1 g/bird), with an increasing estimated by about 36.7% and 30.9%, respectively, where as the difference between these treatments (5.0% and 7.5%) and the control (524.4 g/bird) as well as between 10.0% and the control treatments were insignificant as shown in table2.

Table (2): Effect of application of Molasses on the performance of broiler chicken

Treatments	Performance			
	Feed intake (g)	Body weight (g)	Body weight gain (g)	FCR
0% (Control)	3628.0 a *	2198.3 c	524.4 ab	2.43a
5.0% Molasses	3663.0 a	2430.7 ab	590.5 a	1.97 c
7.5% Molasses	2833.0 b	2516.3 a	565.6 a	2.05 bc
10.0% Molasses	2613.0 b	2323.5 bc	432.1 b	2.40 ab
SE±		73.1	43.3	0.16
Error df	12	12	12	12
F-value	10.4	7.07	5.16	4.04

Means within columns which having similar letters are not significantly different at 0.05 level of probability according to DMRT

3.1.4 Feed conversion ratio (FCR):

Feed conversion ratio was significantly higher under control (2.43) as compared to 5.0% (1.97) and 7.5% (2.05) treatments, with an increasing estimated by about 23.4% and 17.1%, respectively (table2). Meanwhile, the difference between control and 10.0% as well as between 10.0% and 7.55 treatments were not significantly different, while the difference between 10.0% and 5.0% treatments was significant.

3.2 Effect of application of molasses on weight of some broiler organs:

3.2.1 Effect on life weight (g):

Table3 indicates that application of Molasses to the ration of broiler did not significantly affect the life weight and it was ranged between 2499.1 g for control treatment and 2419.3 g for 10.0% treatment.

3.2.2 Effect on heart weight (g):

Similarly, application of Molasses to the ration did not significantly affect the weight of heart for broiler and this parameter was ranged between 13.0 g for control and 12.0 for 7.5% treatment as shown in table3.

3.2.3 Effect on liver weight (g):

Table3 shows that liver weight of broiler chicken was not significantly affected by application of Molasses treatments and it was ranged between 50.0 g for control and 40.0 g for 10.0% Molasses.

3.2.4 Effect on gizzard weight (g):

Gizzard weight also was not significantly affected by application of Molasses and it was ranged between 53.5 g for control and 43.3 for 10.0% treatment.

Table (3): Effect of application of Molasses on broiler organs weight

Treatments	Weight of internal organs (g)			
	Life wt	Heart	Liver	Gizzard
0% (Control)	2499.1 a	13.0 a	50.0 a	53.5 a
5.0% Molasses	2385.8 a	12.6 a	45.0 a	44.0 a
7.5% Molasses	2465.5 a	12.0 a	43.0 a	48.8 a
10.0% Molasses	2419.3 a	12.5 a	40.0 a	43.3 a
SE±	110.9	1.6	4.1	4.1
Error df	12	12	12	12
F-value	0.41	0.01	2.01	2.51

Means within columns which having similar letters are not significantly different at 0.05 level of probability according to DMRT.

3.2.5 Effect on length of large intestine (cm):

Application of Molasses did not significantly affect the length of large intestine (table4), and it was ranged between 186.0 cm for 5.0% and 164.3 cm for control.

3.2.6 Effect on length of small intestine (cm):

Table4 shows that length of small intestine was not significantly affected by application of Molasses treatments and it was ranged between 17.8 cm for 5.0% treatment and 14.6 cm for control.

Table (4): Effect of application of Molasses on broiler organs weight

Treatments	Weight and length of internal organs				
	Length of Large. intestine (cm)	Length of Small. intestine (cm)	Pancreas	Spleen	Dressing%
0% (Control)	164.3 a	14.6 a	4.0 a	1.53 a	11774.9a
5.0% Molasses	186.0 a	17.8 a	4.0 a	1.5 a	11705.6 a
7.5% Molasses	175.5 a	16.3 a	5.0 a	1.5 a	1786.9 b a
10.0% Molasses	178.6 a	16.0 a	5.5 a	1.6 a	1778.8 a
SE±	10.3	1.2	0.5	0.1	75.5
Error df	12	12	12	12	12
F-value	1.53	2.36	3.34	0.32	2.45

3.2.7 Effect on pancreas wt (g):

Application of Molasses did not significantly affect pancreas weight (table4), when both control and 5.0% treatments reported 4.0 g of this parameter, while 7.5% and 10.0% treatments reported 5.0 and 5.5 g, respectively (table4).

3.2.8 Effect on spleen weight (g):

Also application of Molasses as shown in table4 did not significantly affect the weight of spleen, and it was ranged between 1.6 g for 10.0% and 1.5 for both 5.0 and 7.5% treatments.

3.2.9 Effect of Molasses on dressing%:

Table4 shows that there was no significant differences between Molasses treatments for the dressing %and it was ranged between 1786.9 for 7.5% treatment and 1705.6 for 5.0% treatment.

Discussion

The chemical composition of sugar cane molasses was dry matter76.9% crude protein10.1%nitrogen free extract 58.2% and ash 8.6% these agree with (Champman *et.al*., 1965) in the protein content whose said that all types of molasses contain a small quantity of crude protein (3% in mineral soil reaching 10% in organic soil) according to types of soil but are characterized by their extremely high NFE value, and no fiber, and negligible amount of ether extract and protein according to Presten (1987, 1988) and Ly (1987a).Also agreement with (AAFCO,1982 ;Anon,1990;Azaher, 2015) whom found that dry mater range 75%-78%;crude protein2.31%—10.6%; ash between 8.1%-12.39% and nitrogen free extract58%-63%. In their energy content it has content2.513Mj/kg and these in contracting with Anthony(1990) which found that the energy of molasses range between10-15 MJ/kg and these related to the different in the chemical composition of molasses which shows a wide variation as its composition is influenced by many cultural factors such as the type of soil used for cultivation of the crop, ambient temperature, moisture, season of crop production and variety; in addition to production practices, plant processing, and the storage conditions. The variation in composition exists in nutrients content, flavor, color, viscosity and total sugar content (Wornik, 1969; Anonymous, 1970; Hendrickson and Kesterson, 1971; and Presten and Willis, 1974). While sugar content of molasses varies according to the production technology employed, (Baker, 1981).

Effect of application graded levels of sugar cane molasses on the performance of broiler chickens no mortality rate were observed the birds looked healthy throughout during the experiment period and molasses treatments had no significant effect on mortality among experimental groups. In this study the dietary molasses was observed to have no adverse effect on broiler chicks performance these agreement with Azaher(2015) In their study the dietary molasses was observed to have no adverse on broiler chicks performance. Increased feed intake might be due to the fact that, molasses increases the palatability, which was mentioned by Curtin (1983), who indicated that, beside molasses been an energy source, the palatability of molasses makes it an excellent carrier for other feeds especially unpalatable feedstuffs. Moreover, Crampton, (1956); Gohl (1975) and Preston and Leng (1987), addressed that, molasses increases palatability, setting dust, carrier for other essential nutrients, serving as a binder for pelleting and as a source of trace minerals and some microelements. According to Presten (1987, 1988) and Ly (1987a)**,** molasses and sugar cane juice are characterized by their extremely high NFE value, and no fiber, and negligible amount of ether extract and protein. The feed intake in treatment B equal with the control treatment A and lower feed intake in the treatment C and D which showed no significant difference between them and these resulted from the content of the graded levels of molasses in the diets which indicated a significant (P<0.01) increase in feed consumption, body weight gain and feed conversion ratio with increased incorporation of dietary molasses in the results of Hajer, (2007). Increased feed intake might be due to the fact that, molasses increases the palatability, Which was mentioned by Curtin (1983), who indicated that, beside molasses been an energy source, the palatability of molasses makes it an excellent carrier for other feeds especially unpalatable feedstuffs Also the feeding molasses through the diet is that it easily forms cake with feed and increasing of feed intake (Ndelekwute *et al*., 2010).Also body weight, body weight gain and feed conversion ratio showed significant different with increasing molasses levels which better in treatment B 5% and C 7.5%and lower in treatment D 10% and these in contract with founding by Hamza, (1984) in their experiment molasses was included at three different levels 6%, 12% and 15% molasses there was no significant difference (P>0.01) in the amount of feed consumed and body weight. But liver and gizzard decreased by the increasing molasses level in the diets these decreasing in weight of liver related to low lipid content and moisture accumulated in the diets and the decreasing weight of gizzard related to low fiber content of the diets. Both the small intestine and the caecum were enlarged (P<0.05),this could have resulted from increased fermentation in the two segments. Molasses have been reported to cause fermentation in the gut as said by (Guervo *et al*., 1972).

Conclusion:

Molasses is relatively a cheap prices of ,energy source of high nutritive value in Sudan, which is available in sufficient amount that can be included in broiler ration for both safety and lowering the cost compared to sorghum has not been yet used extensively in poultry ration and further research work would be required to determine the upper limit of their use under our local conditions.

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