EFFECT OF DIFFERENT LEVELS OF MOLASSES SOLUTION ON GROWTH, CARCASS YIELD, INTERNAL ORGANS AND ECONOMIC PERFORMANCE OF FINISHER BROILER CHICKENS.

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ABSTRACT
An experiment to determine the effect of different levels of molasses solution on growth, carcass yield, internal organs and economic performance of finisher broiler chickens was conducted. The experiment was carried out using completely randomized design (CRD), and 180 mix sex Anak day old chicks were used. The birds were divided into four treatment (T) groups. Each treatment was replicated three times, each having 15 birds. The T1 was the control while T2, T3 and T4 were addition of 20 g, 40 g and 60 g of molasses, respectively to a litre of drinking water to form molasses solution. These were fed at the finisher phase only. Results indicated that after four weeks of feeding of the molasses, all the levels of molasses improved final weight. 60 g/litre of molasses produced higher feed intake, dressed percentage, abdominal fat, larger small intestine and ceacum than the control. Economically, 60 g/litre improved revenue and gross margin per bird over the control. Therefore, addition of 60 g of molasses per litre of drinking water could be recommended to be added during the finisher phase.
Keywords: broiler chickens, carcass yield, economic, internal organs, molasses solution.

Introduction

World over, one major challenge encountered by poultry farmers are cost of feed. In Nigeria, this is rapidly increasing. For instance, Udedibe (2003) reported that over the last 20 years the prices of feed have risen by 2000 %. This increase in prices tends to slow progress in poultry industry in Nigeria, irrespective of increasing demand for chickens and eggs. Ndelekwute *et al*. (2008) maintained that broiler chicken demand in Nigeria is progressively rising, because most consumers are gradually shifting their interest from high fat to low fat meat. This was attributed to fear of high level of cholesterol in such meat as beef (Ndelekwute *et al*., 2008)

As a result of this increasing demand for chicken, the supply and quality of products should be increased and improved. However, this is impeded by high cost of production and use of commercial feeds which quality could be questioned. Uchegbu *et al*. (2007) reported that there were inadequacies in the quality of some commercial chicken feeds and resultant poor performance of birds. As a result, farmers supplement their feed with ingredients such as fish meal, blood meal, synthetic amino acids and edible oils. Nevertheless, addition of these ingredients could increase more the cost of production. Emphasis has been to use non conventional feed ingredients as sources of protein and energy in order to maximize profit. Molasses which is a source of soluble sugar falls under this category of feed ingredients. It is a by-product of sugar industry and a dark brown viscous liquid (Waldroup, 1981).

Molasses have been extensively used in diet to feed both pigs and chickens (Waldroup, 1981; Waliszewski *et al.,* 1997; Ndelekwute *et al*., 2010). The problem of feeding molasses through diet is that it easily forms cake with feed. The caking problem is better solved by feed pelleting which farmers cannot afford (Ndelekwute *et al*., 2010). Recently, Ndelekwute *et al*., 2010 and Ndelekwute *et al*., 2011 proffered a solution by feeding molasses through drinking water and reported improved performance. It is worthy of note that both reports, indicated that the authors exposed the birds to molasses solution from starter phase.

Therefore, the objective of this research was to determine the effect of feeding molasses solution during finisher phase only on the performance of broiler chickens.

Materials and Methods

Experimental Site.

The experiment was conducted at the poultry unit of the Teaching and Research farm of University of Uyo, Nigeria, The experiment was conducted during the rainy season with temperature range of 28-32^{0}C throughout the duration of the experiment. The average rainfall and relative humidity were 1500mm and 75% respectively.

Test Ingredient and Experimental Diets.

The molasses used was a by-product of sugar processing factory in Numan, Adamawa state of Nigeria. Starter and finisher diets were formulated to conform to Olomu (1995). Proximate analysis was carried out on the molasses and the diets according to AOAC (2000).

Experimental Design

The experiment which was conducted on completely randomized design (CRD) was carried out using 180 day old chicks of Anak strain. There were four treatments (T) each replicated three times. Each replicate had 15 birds. The T1 was the control while T2, T3 and T4 respectively were fed molasses at the level of 20 g, 40 g and 60 g per litre of drinking water. The birds were not fed molasses during the

starter phase. At the end of starter phase, molasses was introduced. Care was taken to mix the molasses thoroughly with the drinking water to form a solution

Management of Birds

Birds were brooded together for three weeks during which all vaccinations against Newcastle disease and Infection Bursal Disease (IBD) were carried out. The chicks were adequately given medications as prophylactic measures against diseases such as *salmonella, E.coli, coccidiosis* and chronic respiratory disease. The birds were given both feed and water *ad libitum*. At the end of the brooding period, they were transferred together to the rearing house for another one week to complete four weeks of starter phase after which they were grouped into treatments. They were grouped in such a way that the treatments have similar average weight.

Data Collection and Analysis

Data recorded were live body weight, feed intake, water intake, carcass and internal organ values. Live weight and feed intake were used to calculate feed gain ratio. Carcass and internal organ evaluation was carried out according to Scott *et al.* (1989) as reported by Ndelekwete *et al.* (2008). Dressed weight and internal organs were expressed as percentage live weight while cut-parts were expressed as percentage dressed weight (Ndelekwute *et al*, 2013). Economic analysis was carried out in line with Ndelekwute *et al.* (2011).

All data generated were subjected to analysis of variance and significant means were separated as reported by Steel and Torrie. (1980).

Results and Discussion

The nutrient content of the diets were according to the ones recommended by Obioha (1992) and Olomu (1995) as shown in Table 1. The proximate composition of the molasses is shown in Table 2. The moisture content of the molasses was similar to the one reported by Conner *et al*. (1972), but in variance with Oruwari *et al*. (1999) who suggested different processing methods factor to the variation. The ash and crude protein of the molasses agreed with the reports of Waliszewski *et al*. (1997) and Oruwari *et al.* (1999).

Table 1: Experimental Diets

Ingredients	Starter	Finisher
Maize	53.00	53.00
Soybean meal	30.00	25.00
Palm kernel cake	10.30	13.00
Fish meal	3.00	2.00
Bone meal	3.00	3.00
Salt (Nacl)	0.25	0.25
Lysine	0.10	0.10
Methionine	0.10	1.00
Premix**	0.25	0.25
Nutrient composition		
Crude protein (%)	22.12	20.04
Lipid	5.45	4.23
Fibre	4.70	6.20
Ash	7.65	7.89
Nitrogen free extract	65.53	61.64
Calcium*	1.2	1.11
Phosphorus*	1.01	0.89
Lysine*	1.12	1.0
Methionine*	0.61	0.46
Energy (KcalME/kg)*	2845	2855

*Calculated values **Premix supplied per kg. **(Starter Diet),** Vitamin A (15,000IU), vitamin D (5000 IU), Vitamin E (30IU), Vitamin K (2.5mg), Thiamin(2mg), Riboflavin (6mg), Pyridoxine (4mg), Niacin (40mg), Cobalamin (0.02mg), Pantothemic acid (9mg), Folic acid (1mg), Biotin (0.08mg), Choline Chloride (0.06g), Manganese (0.086g), Zinc (0.06g), Iron (0.024g), Copper (0.006g), Iodine (0.0014g), Selenium (0.10), Cobalt (0.024mg), Antioxidant (0.125g). **(Finisher diet).** Vitamin A (10,000IU), Vitamin D3 (2000IU), Vitamin E (20IU), Vitamin K (3mg), Thiamine (2mg), Riboflavin (3mg), Pyridoxine (4mg), Niacin (20mg), Cobalamin (0.05), Pantothemic acid (5mg), Folic acid (0.5mg), Biotin (0.08mg), Choline Chloride (0.2g), Manganese (0.066g), Zinc (0.03g), Iron (0.05g), Copper (0.006g), Iodine (0.006g), Zinc (0.03g), Iron (0.05g), Copper (0.006g), Iodine (0.001g), Selenium (0.24mg), Cobalt (0.25mg), Antioxidant (0.

Table 2: Proximate Analysis of Test Molasses

Parameters	Composition (%)
Moisture	30.04
Crude protein	2.00
Fat/oil/	-
Crude fibre	-
Ash	12.98
Nitrogen free extract	54.98
Energy (KcalGE/kg)	2920

The effect of molasses on growth performance of finisher broilers is shown in Table 3.

Molasses did not have significant effect (P>0.05) on weight gain, feed gain ratio, protein efficiency ratio and water intake, which ran contrary to the report of Ndelekwute *et al*. (2011). All the groups of birds that consumed molasses posted better final live weight than the control irrespective of non significant effect of molasses on feed gain ratio, which was an advantage. Some authors had recommended inclusion of molasses in the diet of broiler chickens for better growth performance (Rieci *et al.*,1980, Ibanez and Ginzalez,1981, Waliszewski *et al*.,1997). This result was in line with feeding of molasses through drinking water which resulted to improved live weight (Ndelekwute *et al*., 2011). There was both higher total and daily feed intake resulting from the feeding of 60 g of molasses compared

Table 3: Effect of Molasses Solution (g/litre of water) on Growth Performance of Finisher Broiler Chickens

Parameters	T1 (0.00)	T2 (20)	T3 (40)	T4 (60)	SEM
Initial live weight (g)	760	750	770	760	30.11
Final live weight (g)	2100^{c}	2160^{b}	2200a^{b}	2240^{a}	50.11
Daily gain (g)	47.86	50.34	50.07	52.82	4.78
Total feed intake (g)	3850^{b}	3810^{b}	4000^{b}	4200^{a}	198.00
Daily feed intake (g)	137.5^{b}	136.07^{b}	142.86^{b}	150.00^{a}	7.01
Feed: gain ratio	2.83	2.72	2.85	2.84	0.35
Protein intake/day (g)	27.57	27.28	28.64	30.08	3.50
Protein efficiency ratio	1.74	1.83	1.75	1.76	0.12
Water intake/day (mls)	303.58	299.66	314.54	330.01	35.00

abc Means along the same column with different superscripts are significantly different (P<0.05). SEM = standard error of the means

to other levels of molasses, which ran contrary to the result of Ndelekwute *et al.* (2011). At that level, molasses would have acted as appetite booster. It was observed that the daily feed intake and total feed intake did follow similar trend. Carcass analyses showed that there were no significant differences (P>0.05) in all the cut-parts.(Table 4). But effect of molasses was significantly noticed in dressed carcass yield and abdominal fat. Feeding of 60g per litre molasses solution resulted to significantly higher dressed percentage compared to the control and other level of molasses. There was no significant difference between the other levels of molasses and the control. This is an indication that higher level of molasses in water is required to improve carcass yield in broiler chickens. Abdominal fat followed similar trend as dressed percentage, suggesting that the birds that consumed 60g per litre could have converted extra energy supplied by molasses to body fat.

Table 4: Effect of Molasses Solution (g/litre of water) on Carcass Yield of Finisher Broiler Chickens

Parameters	T1 (0.00)	T2 (20)	T3 (40)	T4 (60)	SEM
Dressed percentage	65.40^{b}	66.25^{b}	65.70^{b}	72.75^{a}	5.21
Breast (%)	29.45	30.14	30.86	32.40	3.16
Thigh (%)	19.40	18.96	19.30	20.05	2.50
Drumstick (%)	16.40	16.80	22.98	23.16	1.98
Backcut (%)	23.00	23.40	22.98	23.16	1.98
Wing (%)	12.76	12.50	13.01	12.98	1.76
Abdominal fat (%)	0.65^{b}	0.60^{b}	0.68b^{h}	1,00^{a}	0.25

ab Means along the same column with different superscripts are significantly different (P<0.05). SEM = standard error of the means

Feeding of molasses at any of the levels did not have any significant effect (P>0.05) on the weight of internal organs except small intestine and caecum (Table 5). 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 (Guervo *et al*., 1972).

Table 5: Effect of Molasses Solution (g/litre of water) on Internal Organs of Finisher Broiler Chickens

Parameters	T1 (0.00)	T2 (20)	T3 (40)	T4 (60)	SEM
Crop (%)	1.70	1.68	1.72	1.69	0.06
Proventriculus (%)	0.61	0.59	0.60	0.58	0.04
Gizzard (%)	2.25	2.28	2.30	2.31	0.08
Liver (%)	1.90	1.95	1.97	1.96	0.07
Heart (%)	0.55	0.50	0.57	0.54	0.04
Pancreas (%)	0.34	0.33	0.34	0.35	0.03
Kidney (%)	0.82	0.78	0.84	0.79	0.06
Lungs (%)	0.41	0.39	0.38	0.40	0.,2
Spleen (%)	0.14	0.16	0.15	0.16	0.03
Gall bladder (%)	0.17	0.18	0.17	0.17	0.04
Small intestine (%)	4.50^{c}	5.00^{b}	5.10^{b}	5.60^{a}	
Caecum (%)	2.10^{c}	2.60^{b}	2.80^{b}	3.50^{a}	0.25
Large intestine (%)	1.05	1.05	1.07	1.06	0.02

abc Means along the same column with different superscripts are significantly different (P<0.05). SEM = standard error of the means

Table 5 is indicating the effect of molasses on economic indices considered. Molasses did not have significant effect on feed cost (P>0.05). Cost per kilogramme feed did not alter numerically because molasses was not added to the feed. Revenue and gross margin were positively (P<0.05) influenced by 60g per litre and non significant effect was recorded at lower levels in comparison with the control. The result was so because molasses did not influence feed cost significantly and also, better live weight was achieved by molasses.

It could be concluded that 60g of molasses per litre of drinking water could be fed to broiler chickens at finishing phase for improved growth, dressed percentage and economic maximization.

Table 6: Effect of Molasses Solution (g/litre of water) on Economics of Finisher Broiler Chickens

Parameters	T1 (0.00)	T2 (20)	T3 (40)	T4 (60)	SEM
Cost/kg feed (N)	91.50	91.50	91.50	91.50	
Molasses intake/bird (N)	-	0.25	0.27	0.29	
Feed cost/gain (N)	258.95	248.88	260.78	258.44	36.60
Feed cost/bird (N)	352.28	348.87	366.26	384.70	41.60
Revenue/bird (N)	1260^{b}	1296a^{b}	1320a^{b}	1344^{a}	80.11
Gross margin/bird (N)	907.72^{b}	947.38a^{b}	954.00^{ab}	959.57^{a}	50.40

abc Means along the same column with different superscripts are significantly different (P<0.05). SEM = standard error of the means

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