NSAP 47th Annual Conference (JOS 2022) CONFERENCE PROCEEDINGS
THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

GROWTH PERFORMANCE OF BROILER CHICKENS FED VARYING DIETARY LEVELS OF SORGHUM DISTILLER WASTE FLAVOURED WITH MOLASSES

Zarma, A.G., Malik, A. A. and Alabi, O.J.
Department of Animal Production, Federal University of Technology, Minna, Niger State, Nigeria.
***Corresponding author*: adamuzarmafut2015@gmail.com;**
Phone Number: +234 8064585143

Abstract
This study was aimed at investigating the effect of feeding varying levels of sorghum distiller waste flavoured with molasses on growth performance of broiler chickens. A total of 180-day old broiler chickens were distributed into four treatments using a completely randomised design. Each treatment had three replicates with 15 birds per replicate. Treatment 1 served as the control which had 0 % level of molasses flavoured sorghum distiller wastes (MFSDW). Treatments 2,3 and 4 had 10, 20 and 30 % MFSDW respectively. The experiment lasted for eight weeks in which the birds were fed broiler starter diets for four weeks and broiler finisher for another four weeks. Feed and water supplied *ad libitum* and data were collected on growth performance. The results showed that feeding MFSDW to broiler chickens significantly improved ($P < 0.05$) their growth performance. In conclusion, this study sorghum distillers' waste flavoured with molasses can be included up to 30 % in broiler chicken diets without detrimental effect on their growth performance.

Keywords: Molasses, Flavoured, Sorghum, Distiller, Wastes, Broilers

Introduction
In Nigeria, broiler chickens have a very high potential for meeting the daily animal protein requirements for the populace as it has a better feed conversion ratio compared to other species of domestic animals (Daryll and Harwood, 2013), It is rated higher than that of any other species of domestic animals, and can be conveniently used to substitute red meat, thereby reducing the dangers associated with the consumption of red meat.

Animal feed is the largest cost item in livestock production, especially poultry, accounting for between 60-70 % of the total cost of production (Thirumalaisamy *et al*., 2016). Due to high cost of conventional feed ingredients, there is the need to identify and use locally available feed resources to compound feeds that are nutritionally balanced, with the aim of reducing the total cost of production and maximize profit. (Leeson and Summers, 2005). The rapid expansion of local breweries has stimulated interest in feeding the major by-product of ethanol production process, distillers' waste (DW), to livestock (Dinneen, 2007). High concentration of sulphur in DW (Pritchard, 2007) could potentially result in health problems and decrease in performance (Gould, 1988). In order to effectively utilize these by-products for non-ruminants, they have to be subjected to treatments that will improve and facilitate nutrients release as well as enhance their palatability and rate of consumption by broilers. One way of enhancing the palatability of distillers' wastes in broiler diet is the addition of molasses as a flavouring agent and supplement. Flavouring distillers' wastes with molasses is an attempt to enhance its consumption by broilers. Utilization of sorghum distillers waste to feed broilers is geared towards reducing the cost of production and thereby maximizing profit. Hence, this study was carried out to evaluate the potency of molasses in combination with sorghum distillers' waste sourced from local distilleries as feedstuff for broiler chicken.

Materials and Methods

Study area

This research study was carried out at the Poultry Section of the Department of Agricultural Education, Federal College of Education, Kontagora, Niger State. Kontagora is geographically located on longitude 5.47^0 E and Latitude 10.40^0 N. The Climate is characterized by mono peak rainfall regime with long dry and short heavy rainfall that lasts for about three to four months. The vegetation in Kontagora is typically of the guinea savanna type (Ibrahim, 2017).

Table 1 Composition of the experimental diets at starter and finisher phases

	Starter Phase				Finisher Phase			
Ingredients (%)	**T1**	**T2**	**T3**	**T4**	**T1**	**T2**	**T3**	**T4**
MAIZE	43.00	35.00	25.50	24.00	44.50	40.50	35.50	31.50
MAIZE OFFAL	3.75	5.75	8.25	6.25	11.75	9.75	9.25	7.75
SOYA BEAN CAKE	15.00	13.00	10.00	11.00	12.00	10.00	10.00	8.00
FULL FAT SOYA	32.00	30.00	30.00	22.5	25.00	23.00	19.00	16.00
BONE MEAL	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
LIMESTONE	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00
PALM OIL	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
SALT	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
VITAMIN PREMIX*	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
LYSINE	0.50	0.50	0.50	0.50	0.25	0.25	0.25	0.25
METHIONINE	0.50	0.50	0.50	0.50	0.25	0.25	0.25	0.25
MFSDW	0.00	10.00	20.00	30.00	0.00	10.00	20.00	30.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CALCULATED ANALYSIS								
Crude Protein (%)	23.00	23.10	23.40	22.90	20.20	20.30	20.06	20.09
ME (kcal/kg)	3117.80	3061.20	3008.80	2955.40	3103.60	3073.00	3022.20	2983.10
Ether Extract (%)	10.31	9.79	9.52	8.27	9.30	8.74	7.94	7.27
Crude Fibre (%)	4.26	5.10	6.00	6.44	4.70	5.14	5.78	6.24
Calcium (%)	1.39	1.40	1.41	1.41	1.36	1.37	1.38	1.31
Avail P %	0.59	0.59	0.59	0.59	0.50	0.57	0.57	0.58
Lysine	1.53	1.50	1.48	1.41	1.28	1.26	1.21	1.19
Methionine + Cystine	0.92	0.86	0.85	0.82	0.80	0.78	0.75	0.73

Source of feed ingredients
Sorghum distillers' waste was obtained from the local brewers (burkutu makers) in the Mammy Market at the Army Barracks in Kontagora, Niger State, The molasses were obtained from the Savannah Sugar Company in Numan, Adamawa State. Maize and soya beans (full fat) were obtained from the Kontagora Market while the soya bean cake, limestone, bone meal, lysine, methonine, premix and salt were obtained from Hajia Hauwa Feed Mill, behind the Federal University of Technology, Bosso Campus, Minna.

Source of experimental birds, experimental design and management
A total of 180-day old *Arbor Acre* strain of broiler chicks were obtained from Courage Farm, along Lagos- Ibadan Express way, Ibadan, Oyo State. The study was set up as a Completely Randomized Design (CRD) with four treatments which were replicated three times. The treatments were the sorghum DW flavoured with molasses at 0, 10, 20 and 30 %. 15 birds were allotted to each experimental unit after acclimatizing them for one week. Routine management practices (sanitation, vaccination/medication and feeding) were carried out during the study.

Preparation of molasses-flavoured sorghum distillers' wastes and experimental diets
The diets used for the study were formulated in accordance with the nutrient requirements of broiler chickens as recommended by Aduku (1993) and Olomu (2011) as shown in Table 1 (for the starter and finisher phases). Sorghum distillers waste was collected from some local breweries in Kontagora, and sun dried on clean surfaces for a few days until fully dried. Ninety four parts (94 %) of the dried sorghum distillers' wastes were mixed with 6 parts (6 %) molasses until a homogenous mixture was achieved. This was achieved by first mixing a small quantity of the sorghum distillers waste with the 6 % molasses after gently warming it over a low heat to obtain a homogenous mixture, before finally mixing it with the bulk. This was labeled molasses-flavoured sorghum distillers' waste (MFSDW). This was used in the preparation of the broiler chicken diets at various levels of inclusion.

The composition of the experimental diet is shown below:

Diet 1 (T_1) = 0 % inclusion of MFSDW
Diet 2 (T_2) = 10 % inclusion of MFSDW
Diet 3 (T_3) = 20 % inclusion of MFSDW
Diet 4 (T_4) = 30 % inclusion of MFSDW

Data collection and analysis
Data on feed intake, weight gain, feed conversion ratio and mortality were collected during the study. Data obtained on various parameters were analyzed using SSPS (2007) statistical package. SEM (standard error of the means) was used to separate the means where there are statistical significance differences.

Results
Results of the effects of feeding varying levels of sorghum distillers' wastes flavoured with molasses on the growth performance of broiler chickens is presented in Table 2. The results showed that feeding varying dietary levels of sorghum distiller wastes flavoured with molasses had effect ($P < 0.05$) on all the growth performance parameters measured except mortality.
Broiler chickens fed diets T1, T3 and T4 had similar ($P > 0.05$) final body weight (FBW) and body weight gain (BWG) which was significantly higher than the values recorded for birds fed diet T2.

Furthermore, the feed intake (F.I.) of birds in T2, T3 and T4 were similar ($P > 0.05$) and significantly lower than those recorded for birds fed the control diet.

Feeding varying levels of sorghum distillers' waste flavoured with molasses had effect ($P < 0.05$) on the feed conversion ratio (FCR) with birds in T1, T3 and T4 having significantly lower FCR than birds in T2.

Table 2 Growth performance of broiler chickens fed sorghum distiller wastes flavoured with molasses

Parameters	T_1 (0 %)	T_2 (10 %)	T_3 (20 %)	T_4 (30 %)	SEM	P - value
Initial weight (g/b)	121.88	122.44	123.81	124.88	0.419	0.116
FBW (g/b)	1765.00 ^{a}	1666.67 ^{b}	1818.33 ^{a}	1858.33 ^{a}	25.162	0.010
BWG (g/b)	1643.12 ^{a}	1544.53 ^{b}	1694.52 ^{a}	1734.22 ^{a}	24.870	0.010
Feed intake (g/b)	7602.19 ^{a}	7578.00 ^{b}	7588.13 ^{b}	7579.41 ^{b}	33.83	0.011
FCR	4.63 ^{b}	4.91 ^{a}	4.48 ^{b}	4.37 ^{b}	0.071	0.009
Mortality (%)	2.00	2.33	2.33	2.00	2.170	0.916

FBW= Final Body Weight, BWG= Body Weight Gain, FCR= Feed Conversion Ratio; g/b = Gram per bird. Data having the same superscript along a row are not significantly different from each other at P=0.05

Discussion

Feeding 0, 20 and 30 % sorghum distiller wastes flavoured with molasses significantly improved both the FBW and BWG of broiler chickens. As the level of sorghum distiller wastes increased, it was observed that these parameters also increased, although such increase was not significant between 20 and 30 % inclusion levels of MFSDW. This could be due to the reduced negative impact of undigested residues on digesta viscosity as reported by Khose *et al*. (2017) who studied the effect of feeding sorghum distiller dried grains with solubles and enzyme supplementation on performance of Vencobb broiler chickens. The result of the present study is at variance with that reported by Hassan and Al Aqil (2015) and Khose *et al*. (2017) who had observed no significant differences in the FBW and BWG of broiler chickens fed sorghum distiller dried grains. The reason for the differences could be as a result of differences in the breeds of broiler chickens used as *Arbor Acre* chicks was used for the present study while Vencobb 400 was used by Khose *et al*. (2017).

The feed intake was not significantly different upon feeding broiler chickens varying levels of sorghum distiller waste flavoured with molasses but the chickens fed the control diet had significantly higher feed intake. Supplementing 10 % sorghum distiller wastes flavoured molasses based diet to broiler chickens significantly increased feed conversion ratio (FCR) compared to birds fed 0, 20 and 30 % diet. This could imply that at lower levels of sorghum distiller wastes, there is reduced feed utilisation when compared to other levels. Thus, with higher inclusion of MFSDW, consumption of less feed resulted to more weight gain. This is in agreement with the result reported by Barakatain *et al*. (2014) and Khose *et al*. (2017) who also recorded a significant difference in the FCR of broiler chickens fed sorghum distillers' dried grains. On the other hand, studies carried out by Damasceno *et al*. (2020) showed that feeding sorghum distillers' wastes to broiler chickens did not influence their FCR. This could be as a result of differences in the strain of the broiler chickens used for the study.

Conclusion and recommendations

In conclusion, results of the study suggest that sorghum distiller wastes flavoured with molasses can be included in broiler chicken diet up to 30 % without causing detrimental effect on the growth performance of chickens. This is sequel to comparable effect of diets with 20 and 30 % MFSDW inclusion to convention diet of broiler chicken.

References

Barakatain, M. R., Choct, M. and Iji, P. (2014). Australian Poultry Science Symposium Proceedings, 22. ISSN: 2011 – 1034 – 6260

Damasceno, J. L., Rocha, C. S., Eyng, C., Broch, J., Souza, C., Wachholz, L., Cirilo, E. H., Avila, A. S., Pires Filho, I.C. and Nunes, R.V. (2020). Effect of feeding dried distillers' grains with solubles to broiler chickens from day 0 to 21. *Livestock Science*, 241. https://doi.org/10.1016/j.livsci.2020.104232

Daryll, E. R. and Harwood, D. S. (2013). Broiler Production and Consumption trends. Agricultural Policy analysis centre, University of Tehnessee, Knoxville (865) 974 – 7407.

Gould, D.H. (1998). Polioencephealomalacia. *Journal of Animal Science, 76*: 309–314.

Hassan, S. M. and Al Aqil, A. A. (2015). Effect of adding different dietary calcium to available phosphorus ratios on productive performance and egg shell quality of white egg layer hens. *International Journal of Poultry Science*, 14(2), 13 – 18

Khose, K. K., Manwar, S. J., Dhore, R. N., Kuralkar, S. V. and Waghmare, S. P. (2017). Effect of feeding sorghum distillers dried grains with solubles and enzyme supplementation on performance of broiler chickens. *Chemical Science Review and Letters*, 6(24), 2413 – 2420.

Leeson, S. and J. D. Summers (2005) Scott's Nutrition of the Chicken. 4th edition. Guelph, Ontario, Canada: University Books.

Pritchard, R. H. (2007). Corn by-products: considerations involving sulphur in production. Nutritional Council Spring Corf. Pp 43-48.

Thirumalaisamy, G., Muralidharan, J., Senthilkumar, S., Hema Sayee, R. and Priyadharsini, M. (2016).Cost-effective feeding of poultry. *International Journal of Science, Environment, 5 (6)*:3997 – 4005.