



Proximate composition and feeding value of ensiled blend of cassava root meal and wet brewers' grains in starter broiler diets

Emenalom, O.O., Etuk, E.B., Okoli, I. C., Aladi N.O., Okechie U.N. and Njemanze, O.I.

Department of Animal Science and Technology, Federal University of Technology, Owerri, Nigeria.

**e-mail:emenalom62@gmail.com*

ABSTRACT

The proximate composition and feeding value of ensiled blend of peeled cassava root meal and wet brewer's grain in starter broilers diets were evaluated. Peeled cassava root meal and wet brewers' grain were mixed together in a ratio of 1.0:1.5, divided into 3 parts and ensiled for 0, 7 and 14days, respectively. The ensiled products were then sun dried and their proximate and gross energy values determined. Four experimental broiler starter diets were formulated such that diet 1(control) contained 100% maize. Diets 2, 3 and 4 contained 50% of the 0, 7 and 14days ensiled products as replacement for maize, respectively. One hundred and twenty (120) day old broiler chicks divided into 12 groups were randomly assigned to each of the four experimental diets in a completely randomized design, replicated three times. Feed and water were offered to the birds *ad-libitum*. The 14 days ensiled product had higher crude protein, ether extract, crude fibre, ash and gross energy values than the 7days ensiled product. Body weight gain and feed conversion values were comparable with those of the control. Feed intake, cost of feed consumed and feed cost/ kg weight gain of the control birds were significantly ($p < 0.05$) higher than the other treatment groups. It is concluded that mixing peel cassava root meal and wet brewers' grain before sun drying or ensiling and sun drying, enhanced the protein content, and reduced the dustiness in the feed and cost of production irrespective of the period of ensilage. The inclusion of 50% of the ensiled products *should be considered as cost effective feedstuff in broiler ration formulation*.

Key words: Cassava, brewers' grain, ensilage, broilers, performance

INTRODUCTION

Cassava is not necessarily a novel feed ingredient in some countries and regions, but it is novel to use it as feed in most countries (Morgan and Choct, 2016). Cassava roots contain a large amount of starch ranging from 70 to 85% DM which increases with the stage of harvesting (; Ly, 1998; Regnier, 2011). The fibre content is also extremely low (NDF less than 10% DM) which makes the cassava roots highly digestible in all livestock species. The metabolisable energy value of good cassava meal (72% starch) is equivalent to that of maize (Saawant et al, 2004). Low cassava (less starch, more fibre) has lower ME values and the ME of unpeeled cassava meal is reduced to about 85% that of maize (Agwunobi et al, 2000).

Cassava roots are considered as energy feed for poultry, however, their protein content (typically less than 3%) is lower than that of cereal grains. Hydrogen cyanide (HCN) content may or may not be a problem depending on the variety, processing and livestock species. Grinding cassava results in high levels of fine particles which can reduce feed intake and possibly irritate respiratory organs (Garcia et al, 1999). However, while there is no hard limit on the inclusion level of high-grade cassava in pelleted diets on grower to finisher broilers, the low protein content and fine particles of cassava limits its inclusion to 30 – 40% of dietary requirements.

Fermentation or ensilage has been reported to have caused reduction in the level of anti nutrients within the feed (Okpako et al., 2008), improve bioavailability of minerals (e.g. phosphorus, calcium, magnesium and copper), increase proteins (lysine, histidine and methionine) and breakdown of indigestible carbohydrates (Missotton et al., 2008). Silage is a good method of storing wet brewers' grain for a longer period particularly since ensiling does not alter their nutritive value (Gevon et al., 2008). According to Blezinger



(2003), packing and ensiling characteristics can be improved by blending the wet brewers' grains prior to ensiling with dry materials such as molasses or cereal grains. This experiment was therefore conducted to determine the proximate chemical composition of ensiled blend of cassava root meal and wet brewers' grain and its efficacy on broiler performance at 28 days of age.

MATERIALS AND METHODS

This study was carried out at the Teaching and Research Farm of the School of Agriculture and Agricultural Technology, Federal University of Technology Owerri, Imo State, Nigeria. Peeled cassava root meal and wet brewers' grain were mixed together in a ratio of 1.0:1.5 and then divided into three equal parts. The first part was sundried immediately after mixing while the second and third parts were separately packed inside black polythene bags, tied (air tight) to remove oxygen and stored for 7 and 14 days, respectively under room temperature. At the end of each ensiling period, the product was sundried for 2 to 3 days depending on the intensity of the sun. Samples of the non-ensiled and ensiled products were analyzed for their proximate compositions according to AOAC (2000). *Four experimental broiler starter diets were formulated such that diet 1 (control) contained 100% maize. Diets 2, 3 and 4 contained 50% of the 0, 7 and 14 day ensiled products as replacement for maize, respectively (table 1).*

Table 1: Ingredient composition of broiler starter diets containing ensiled blend of peeled cassava root meal and wet brewers' grain

Ingredient (%)	Ensilage period			
	Control	0	7	14
Maize	55.00	27.50	27.50	27.50
EB-CB	0.00	27.50	27.50	27.50
Others*	45.00	45.00	45.00	45.00
Total	100	100	100	100
Calculated analysis (%)				
Crude protein	21.21	21.70	21.56	21.86
Crude fibre	3.89	6.60	6.60	6.77
Ether extract	8.53	10.46	9.36	9.91

*contains; 25% Soybean meal, 6% wheat offal, 5% PKC, 5% fish meal, 3% bone meal, 0.25% Lysine, 0.25% Methionine, 0.25% premix and 0.25% salt. EB-CB: ensiled blend of cassava root meal and brewers' grain

One hundred and twenty (120) day-old broiler chicks of Cobb strains were used for the trial. The birds were divided into 4 groups of 30 birds each. Each group was sub-divided into 3 replicates of 10 birds, housed in a 1.4 x 1.4 m compartment. Wood shavings were used as the litter material. The pens were covered with black polythene for the first two weeks to control wind and heat. Each pen contained a feeder, drinker and a stove (to supply heat) for the first two weeks. The diets were randomly assigned to each of the pens in a completely randomized design (CRD) replicated 4 times. All the birds appeared healthy and active with no abnormalities. Feed and water were offered *ad libitum*. The birds were vaccinated against Infectious Bronchitis, New Castle Disease Virus and Infectious Bursitis (Gumboro) following the program applied in our Institution.



The birds were weighed on arrival and weekly thereafter. Daily feed intakes were recorded by subtracting the quantity of feed that remained from the quantity given. Weekly weight gains were obtained from the differences between the weights of two successive weeks. Feed conversion ratios were obtained from the quotient of the feed intakes and the weight gains. Data generated were statistically analyzed using analysis of variance and means were separated using the R-cran programme of R Core Team (2014).

RESULTS AND DISCUSSION

Proximate composition

Data on the proximate composition of ensiled blend of peeled cassava root meal and wet brewer's grains are presented in tables 2. Crude protein, crude fibre and ash values were higher in the 14 days than in the 0 and 7 days ensiled products. The gross energy and ether extract contents were reduced by ensiling. The crude protein values of the products were higher than that reported for maize and could therefore replace maize weight for weight in poultry diets.

Performance of the experimental birds

Data on the performance of starter broilers fed diets containing ensiled blend of peeled cassava root meal and brewers' grain are shown in table 3. Weight gain, and feed conversion value of birds fed the ensiled and non-ensiled products were comparable to those fed the control diet throughout the trial. Feed intake decreased significantly ($p < 0.05$) in both the ensiled and non-ensiled products when compared with the control. *The comparable weight gain and feed conversion ratio of birds fed the product diets with the control is an improvement to earlier reports that inclusion of cassava root meal and brewers' grain in broiler diets reduced performance at a high level above 30% inclusion level. (Akinfala et al., 2002. Buitrago et al., 2002).*

Costs of feed consumed and feed costs/kg gain of birds fed the ensiled and non-ensiled products were significantly ($p < 0.05$) decreased when compared with those fed the control diet. Inclusion of the 0, 7 and 14 days ensiled products in starter broiler diets caused ₦76.01, ₦76.07 and ₦69.80 reductions in the Costs of feed consumed and ₦134.44, ₦132.07 and ₦129.72 reductions in Feed cost/kg gain, respectively. This benefit may be explained by the lower costs of the 0, 7 and 14 days and ensiled products relative to that of maize.

Conclusion

The results of the study showed a decreased in the crude protein and gross energy values of the products at 7 days of ensilage and an increase in the values at the 14 days ensiling period. Weight and feed conversion ratio of the birds were not negatively affected by the treatments irrespective of ensilage period. The products also should beneficial effects in decreasing the costs of feed consumed and feed costs/kg weight gain. Consequently, ensiled or non-ensiled blend of peeled cassava root meal and wet brewers' grain should be considered as cost effective feedstuff in broiler ration formulation.

Table 2: *Proximate composition of ensiled blend of peeled cassava root meal and wet brewer's grains*

<i>Days of ensilage</i>	<i>0</i>	<i>7</i>	<i>14</i>	<i>SD</i>
<i>Dry matter</i>	92.50	93.10	92.61	0.32
<i>Crude protein</i>	12.75	12.14	13.36	0.61
<i>Ether Extract</i>	12.00	8.00	10.00	2.00
<i>Crude fibre</i>	11.88	11.88	12.50	0.36
<i>Ash</i>	1.99	1.98	2.01	0.02
<i>Nitrogen free extract</i>	56.08	61.09	57.09	2.65
<i>Gross energy (kcal/kg)</i>	4572.22	4350.50	4470.25	110.98



Table 3: Performance of broiler chicks fed diets containing ensiled blend of peeled cassava root meal and wet brewers' grain (0-28 days)

Parameter	Days of ensilage				SEM
	Control	0(T ₁)	7(T ₂)	14(T ₃)	
Initial weight (g)	50.00	50.00	50.00	50.00	0.00
Final weight (g)	602.21	588.67	582.06	596.24	2.61
Weight gain (g)	552.21	538.67	532.06	546.24	12.61
Feed intake (g)	1409.22 ^a	1227.05 ^b	1226.71 ^b	1273.20 ^b	39.94
Feed conversion ratio	2.59	2.30	2.32	2.33	0.10
Cost of feed consumed (₦)	241.48 ^a	165.47 ^b	165.41 ^b	171.68 ^b	11.11
Feed cost per weight gain (₦/kg)	444.34 ^a	309.90 ^b	312.27 ^b	314.62 ^b	23.17

ab: means within rows with different superscript differ significantly (p<0.05).

SEM: Standard Error Means.

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