

CARCASS CHARACTERISTICS AND ECONOMIC BENEFITS OF USING SUPER SOSAT MILLET (*Pennisetum glaucum*) IN BROILER CHICKENS DIETS

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ABSTRACT

Experiment was conducted at the Bauchi State College of Agriculture, Bauchi Poultry Farm to evaluate carcass characteristics and economic benefits of broiler chickens fed graded levels of Super SOSAT millet (SSM) based diets. Four experimental diets were formulated and designated as diets 1 (0%), 2 (33%), 3 (66%) and 4 (100%) SSM inclusion levels. A total of 208 day-old unsexed Marshal broiler chicks were randomly allotted to four dietary treatments of 52 birds per treatment in a completely randomized design. Each treatment was replicated four times with thirteen birds per replicate. At the end of the feeding trial, representative samples of the birds from each replicate were randomly selected. A total of thirty-two (32) birds with two (2) birds from each replicate were slaughtered, scalded plucked and eviscerated. Live weight of each bird was taken before slaughtering. Live, plucked, eviscerated and dressed weights were determined. Dressing percentage and gut organ's weight were expressed as percentage of live weights. The result revealed that most of the carcass characteristics were not affected except liver (1.81-2.37%), lungs (0.48-0.59%) and intestinal (6.62-9.02%) weights ($P < 0.05$). Abdominal fat (1.17-2.24%) and pancreas (0.29-0.38%) were also affected at ($P < 0.001$; $P < 0.01$ respectively). Both the feed cost (₦/kg) and feed cost in naira per kg body gain decreased with increasing levels of SSM. It can be concluded that SSM can completely replace maize as dietary energy source in the diets of broiler chickens with no adverse effect on carcass yield as well as reduction in feed cost.

Keywords: Super SOSAT millet, carcass yield, economic benefits.

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Introduction

One of the major suspects in food crises in most African countries including Nigeria is protein inadequacy in diets especially the animal protein (Nwokoro *et al.*, 2000). The average animal protein intake in Nigeria is less than the FAO/WHO recommended (35g) (Ngele *et al.*, 2008). The average protein intake in Nigeria is 34.6g of which only 10.6g (19.4%) is of animal origin. (Ajimohun *et al.*, 2012). The current acute shortage of animal protein in Nigeria and the rapidly increasing demand for livestock could be alleviated through broiler production (Nworgu *et al.*, 2000). In many parts of the world, broiler production offers the most rapid and cost effective means of making available high quality animal protein to man (Egbo *et al.*, 2000; Dafwang, 2002). In poultry production, it is known fact that feeding alone accounts for 70 – 80% of the total cost of production in Nigeria (NSA *et al.*, 2016). Maize, the most expensive feed ingredient accounts for the largest proportion of about 50 – 55% of the poultry diets. (Ijadunola *et al.*, 2012). The demand for maize (the chief energy source for poultry) by man as food and other industrial uses coupled with low production locally has placed additional constraints on its continual use in poultry diets (Adamu *et al.*, 2012). There is the need to evaluate other grains like pearl millet (*Pennisetum glaucum*) of Super SOSAT variety as an alternative to maize in broiler chicken diets. Any reduction in the cost of feed will extensively reduce the overall cost of production and increase the profit margin of the farmer.

Materials and Methods

This study was conducted at poultry research unit of the Department of Animal Health and Production, Bauchi State College of Agriculture, Bauchi. Two hundred and ten (210) unsexed marshal day old broiler chicks were procured from chi-chicks hatchery at Ibadan, Nigeria. The birds were reared on deep litter system from 1-7 days they were fed commercial broiler starter diet (Hybrid feed) during this period. Four experimental diets were formulated for the

starter (23% CP) and finisher (20% CP) phases. Super SOSAT millet was included at 0, 33, 66, and 100% levels coded as diet 1, 2, 3, and 4 respectively as presented in tables 1 and 2.

Table 1: Ingredients and percentage composition of dietary levels of SSM fed to broiler chickens at the starter phase (2 – 5 weeks).

Ingredients	Diets			
	1 (0%)	2 (33%)	3 (66%)	4 (100%)
Maize	47.27	31.67	16.07	0
Millet	0	15.60	31.20	47.27
Soya bean	33.43	33.43	33.43	33.43
Fish meal	5.00	5.00	5.00	5.00
Wheat offal	10.00	10.00	10.00	10.00
Lime stone	1.50	1.50	1.50	1.50
Bone meal	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20
Total	100.00	100.00	100.00	100.00
Calculated analysis				
Crude Protein (%)	22.99	23.30	23.61	23.93
ME (kcal/kg)	2996.14	2925.94	2855.74	2844.02
Crude fibre (%)	4.19	5.02	5.83	6.69
Ether extract (%)	7.82	7.27	7.84	7.82
Calcium (%)	1.72	1.73	1.73	1.73
Phosphorus (%)	0.95	0.91	0.95	0.95
Methionine (%)	0.43	0.67	0.66	0.66
Lysine (%)	1.46	1.49	1.52	1.53

ME: Metabolizable energy

Table 2: Ingredients and percentage composition of dietary levels of SSM fed to broiler chickens at the finisher phase (5 – 9 weeks).

Ingredients	Diets			
	1 (0%)	2 (33%)	3 (66%)	4 (100%)
Maize	50.60	33.91	17.20	0
Millet	0	16.69	33.40	50.60
Soya bean	28.10	28.10	28.10	28.10
Wheat offal	15.00	15.00	15.00	15.00
Fish meal	2.00	2.00	2.00	2.00
Lime stone	1.50	1.50	1.50	1.50
Bone meal	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20
Total	100.00	100.00	100.00	100.00
Calculated analysis				
Crude Protein (%)	20.01	20.33	20.67	21.02
ME (kcal/kg)	2910.94	2835.84	2800.65	2783.24
Crude fibre (%)	4.45	5.34	6.21	7.13
Ether extract (%)	7.13	7.14	7.14	7.14
Calcium (%)	1.53	1.54	1.54	1.55
Phosphorus (%)	0.90	0.89	0.90	0.90
Methionine (%)	0.56	0.56	0.56	0.57
Lysine (%)	1.22	1.25	1.27	1.29

After a week of brooding period, about 208 broiler chickens were randomly allotted to four dietary treatments. Each treatment was replicated four times and for every treatment there were fifty two birds with thirteen birds per replicate in a Completely Randomize Design (CRD). The initial weight of the birds was taken for every replicate and average weight per bird was also determined. The bird's weights were recorded on weekly intervals thereafter. Experimental diets and clean water were given *ad libitum*. Feed intake was also recorded. At the end of the feeding trial representative samples of the birds from each replication were randomly selected. A total of thirty two (32) birds, two (2) birds from each replication were slaughtered, scalded plucked and eviscerated. Live weight of each bird was taken before slaughtering. Plucked, eviscerated dressed weights were measured in kilograms. Dressing percentage and gut organ's weights were expressed as percentage of live weight. Data on feed cost for each treatment were also evaluated. All the data generated were subjected to Analysis of variance (ANOVA) using special statistical package (SPSS). Where significant difference between means was observed, New Duncan Multiple Range Test (DNMRT) was used to separate the means.

Results and Discussion

The results of this study (Table 3) indicated live weight (2.16 – 2.49kg), plucked weight (2.06 – 2.35kg), eviscerated weight (1.51 – 1.85kg), dressed weight (1.39 – 1.79kg) and dressing

Table 3: Carcass characteristics and organs weight (% body weight) of broilers fed graded levels of SSM based diets

Parameters	Diets				SEM
	1 (0%)	2 (33%)	3 (66%)	4 (100%)	
Live weight (kg)	2.34	2.46	2.16	2.49	0.14 ^{NS}
Plucked weight (kg)	2.14	2.34	2.06	2.35	0.13 ^{NS}
Eviscerated weight (kg)	1.68	1.77	1.51	1.85	0.11 ^{NS}
Dressing weight (kg)	1.54	1.64	1.39	1.71	0.10 ^{NS}
Dressing percentage (%)	65.59	66.35	64.43	68.68	1.60 ^{NS}
Gizzard (%)	3.49	2.98	3.15	2.88	0.21 ^{NS}
Heart (%)	0.50	0.47	0.49	0.51	0.04 ^{NS}
Spleen (%)	0.14	0.14	0.15	0.14	0.02 ^{NS}
Liver (%)	2.37 ^a	2.08 ^{ab}	2.02 ^b	1.81 ^b	0.11 [*]
Lungs (%)	0.52 ^{ab}	0.48 ^b	0.59 ^a	0.59 ^a	0.03 [*]
Abdominal fat (%)	1.18 ^b	1.17 ^b	2.24 ^a	1.94 ^{ab}	0.20 ^{***}
Intestine (%)	6.62 ^b	7.75 ^{ab}	9.02 ^a	7.34 ^b	0.52 [*]
Pancreas (%)	0.29 ^b	0.31 ^b	0.34 ^{ab}	0.38 ^a	0.02 ^{**}
Head and legs (%)	6.05	5.51	5.73	5.57	0.29 ^{NS}

ab = Means within the same row with different superscripts were significantly different. (*P<0.05, ** = P<0.01, *** = P<0.001);

SEM = Standard Error of the Mean, NS = Not Significant

percentage (64.43 – 68.68%) were not influenced by the graded levels of super SOSAT millet (SSM) based diets. These observations were similar to the findings of Davis *et al.* (2003) which stated that pearl millet inclusion in broiler chicken diets resulted in performance and carcass characteristics similar to or better than corn based diets. This could be due to higher oil content in millet diets and better nutrient utilization than other cereal grains in the diets which has been reported to enhance growth and feed conversion ratio due to improve appetite (Moran, 1996).

Organs weight like gizzard (2.58 – 3.49%), heart (0.47 – 0.51%), spleen (0.14 – 0.15%), head and legs (5.51 – 6.05%) were also not affected. However, liver (1.81-2.37%) lungs (0.48-0.59%) and intestine (6.62-7.75%) (P<0.05) were all influence by the dietary treatment. Similar trend was observed in abdominal fat (1.17-2.24%) (P<0.001) and pancreas (0.29-0.38%) (P<0.01). These findings agreed with the report of Adamu *et al.* (2000) in which pearl millet was fed to broilers at different levels as substitute for maize and reported that organ's weights were significantly (P<0.05) affected by the dietary treatments with the millet fed group recorded higher weights.

Financial Analysis of Broiler Chickens Fed Varying Levels of Super SOSAT Millet (SSM) Based Diets

The financial benefit of using SSM for broiler feeding is presented in table 4. The highest feed cost in naira per kg (₦ 67.31/kg) was found in diet 1 (0% SSM) and the lowest value (₦ 59.09/kg) was observed in diet 4 (100% SSM) based diet). The feed cost decreases with an

Table 4: Financial analysis of the experimental diets fed to broilers chickens

Parameters	Diets			
	1 (0%)	2 (33%)	3 (66%)	4 (100%)
Total feed intake (kg)	5.12	5.51	5.32	5.59
Feed cost (₦/kg)	67.31	64.59	61.88	59.09
Total feed cost (₦/bird)	344.63	355.89	332.29	330.31
Total weight gain (kg)	1.46	1.76	1.51	1.78
Feed cost ₦/kg weight gain	236.05	202.21	211.60	185.57
Cost Saving (₦)	0.00	33.84	24.45	50.48
Percent Cost Saving (%)	0.00	14.34	10.36	21.39

increasing level of SSM in the diet. This could be due to differences in prices of these grains as at the time of purchase. This is in agreement with the findings of Clement *et al.* (2010) which reported the lowest cost of feed/kg in millet based diet, followed by high tannin sorghum, then low tannin sorghum and maize diets. Similar report was made by Yunusa *et al.* (2015) in which the lowest feed cost in naira/kg was observed on gero millet diet when compared to dauro, sorghum and maize diets.

The cost of total feed intake per/bird also decrease with increasing level of SSM in the diet. Although the highest total feed cost per bird (₦ 355.89) was found in diet 2 (33% SSM) while the lowest (₦ 330.31) obtained in diet 4 (100% SSM). This could be attributed to high price of maize and its inclusion level in this diet as well as the rate of feed consumed by the birds. Highest feed cost in naira per kg weight gain of ₦ 236.05 was obtained on diet 1 (control) while the lowest (₦ 185.57) was recorded on diet 4 (100% SSM). The result obtained in this study conformed with the findings of Ibe *et al.* (2014) and Yunusa *et al.* (2015). They reported that gero millet based diet seems to be most economical for broiler feeding as the best and economical feed cost in naira per kg was found in this diet when compared to other common cereal grains.

Conclusion

It can be concluded that SSM can completely (100%) replace maize as dietary energy source in the diets of broiler chickens with no adverse effect on carcass yield as well as reduction in feed cost.

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