

## Utilization of Millet (*Pennisetum Spp*) as an Energy Source by Broiler Chickens: A Review

<sup>1</sup>Maidala, Aminu. & <sup>2</sup>Abdullahi, Ishaq Bilkisu

<sup>1</sup>Vocational and Technology Education,  
Abubakar Tafawa Balewa University,  
P.M.B. 248, Bauchi, Nigeria

<sup>2</sup>College of Education, Kangere,  
Bauchi State, Nigeria

Corresponding author: [aminumaidala@yahoo.com](mailto:aminumaidala@yahoo.com)

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### ABSTRACT

*Maize is the conventional source of energy in broilers ration in Nigeria. The ever growing demand for maize for human consumption, livestock feeds and some industrial uses has pushed its market price to an alarming height. The Metabolizable energy value of maize and millet are 3432 and 2984 kcal/kg respectively, the crude protein content of maize and millet are 9.0 and 11.50 % respectively, the crude fat values of maize and millet are 3.25 and 5.50 % while the crude fibre of maize and millet are 2.7 and 6.5 % respectively. Millet is a suitable alternative to maize considering the cost, availability and their nutritive value. Several research findings revealed that there is no significant ( $P < 0.05$ ) difference in the performance parameters among the two energy sources. Alternative sources of energy like millet will reduce the cost of feeds; improve protein availability and intake, increase efficiency and productivity of broiler chickens as well as the improving the profit margin of the poultry producers.*

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### Introduction

Poultry birds especially broilers play a significant role in the provision of animal protein required by man to meet his daily protein intake (Ogundipe, 2003; Igwebuike *et al.*, 2009; Maidala and Istifanus, 2012). They have high growth rate, high feed conversion ratio, short generation interval (5-6 months), short intestinal feed transit of 2-3 hours and traits that respond to feeding and nutritional manipulations within days (Atteh, 2003). The chicken meat is superior to that of other livestock species because it is associated with relatively lower calorie and sodium intake while containing high protein content than other sources of meat (Atteh, 2003). Poultry meat is nutritious, tender, juicy, tasty and generally appealing and accepted when processed (Omole *et al.*, 2006). Nutrition is perhaps the most important consideration in livestock management. Inadequate supply of feeds, nutritionally unbalanced rations, adulterated ingredients or stale feeds are some of the factors responsible for low productivity of livestock in tropics (Ogundipe *et al.*, 2003) Apart from nutrition, Poultry industry contributes significantly to family income (Ogundipe *et al.*, 2002). Feeding is the major constrain of poultry production which accounts for 70-85% of recurrent expenditure (Sanni and Ogundipe, 2005). The energy level of the feed is the major factor influencing feed intake as birds will under normal circumstances eat to satisfy their energy needs (Akinola and Sese, 2011). The other dietary nutrients usually vary in relation to dietary energy content of the diet if they are not to become deficient with low feed intake or consumed more with low energy diet. Maize is the major source of energy in poultry feeds and constitutes 50-70% of broilers ration (Ojowola and Olugbemi,

2011). It constitutes 40-60% of the feed of monogastric animals (Ayenor, 1985; Ogbanna, 1991). Maize also serves as staple food for good proportion of Nigerians. Maize is used for other purposes such as biofuel, brewing, starch industries and for human consumption. However, inadequate production of this grain and the intense competition for maize between man, industries and livestock especially in the drier areas of the tropics has made poultry rations to be expensive (FAO, 2006). This is because maize is high in energy and forms the standard (100%) against which other cereals grains is compared (Atteh, 2002). Maize has a fat content of about 4% and this fat is high in linoleic acid (about 50%) making it excellent source of this essential fatty acid. The increasing competition between man and animals for available grains (Tegbe, *et al.*, 1984; Egbunike and Achibang, 2002), the inadequate production of farm crop to meet the needs of man and his livestock (Babatunde *et al.*, 1990) and ever increasing cost of maize had made it necessary to critically re-evaluate some other grains like millet and sorghum for alternative energy sources in poultry production. In poultry nutrition energy is used for the provision of body heat, maintenance, growth and production (Inaku *et al.* 2011). From the foregoing, it is imperative that effort should be made to explore comparative and cheaper alternative to this scarce, expensive and highly needed dietary resource so as to reduce cost of feed ingredients, improve availability, increase both efficiency and productivity of broiler chickens, improve poultry farmers profit margin and above all increase protein intake among the populace.

## Results and discussion

Millet is a possible alternative that can replace maize 100% in broiler ration (Abubakar *et al.*, 2006; Ojewola and Olugbemi, 2011; Abubakar *et al.*, 2011; Ibitoye *et al.*, 2012). Millet is native to the western edges of the Sahara desert and is commonly grown as a forage and grain crop in arid areas of Africa and India. It grows well under conditions of erratic rain, high temperatures, and poor soil conditions. Additionally, millet is a fast-growing crop (Baurhoo *et al.*, 2011). Millet is widely grown for food in the semi arid environment and rank 4<sup>th</sup> most important tropical food cereal with 26<sup>th</sup> million hectare (64 million acres) being mostly grown in semi arid of West Africa and India. According to Atteh, 2002, millet contain 2881kcal/kg metabolisable energy (ME), 6.50% crude fibre (CF), 0.30% ash, 11.50% crude protein (CP), 3.60% ether extract (EE) and 3.20% total digestible nutrients (TDN). The crude protein content of millet, although variable, is higher than maize (Burton *et al.*, 1972; Sullivan *et al.*, 1990; Adeola and Rogler, 1994; Amato and Forester, 1995) and the essential amino acid profile is more balanced than maize (Sullivan *et al.*, 1990; Amato and Forester, 1995). The protein in millets is well balanced in limiting amino acids for practical poultry diets. Lysine, Methionine and Cystein contents in finger millet is about 2.86%, 1.75% and 1.51% of the crude protein (Rachie and Peters, 1997). Therefore their incorporation in place of maize can reduce the dependency on maize and also reduce the cost of poultry production. Millet also has higher oil content than other cereal grains (Sullivan *et al.*, 1990; Hill and Hanna, 1990; Adeola and Rogler, 1994) and is a better source of linoleic acid (Rooney, 1978). It has also been indicated that millet is superior to maize and sorghum in protein content and protein quality, as well as protein efficiency ratio (PER) values. According to Olomu, (1995) millet has a lower Metabolizable energy (2555kcal/kg) but higher percent crude fibre (4.30%), ash (3.00%) and crude protein (12.0%) compared to maize. Millet posses the ability to thrive on poor sandy soils and it is known to contain substantial amount of nutrients that is more closely to maize. It is against this

background this write up attempt to review the utilization of millet as alternative energy source in the diets of broilers. Incorporation of millet in place of maize can reduce the dependency on maize and also reduce the cost of poultry production. The metabolisable energy of maize and millet are 3432 and 2984 respectively (Aduku, 2004). The amino acid in millet are well balance and contain limiting amino acids such as Methionine 0.28%, cystein 0.24%, Lysine 0.35%, Tryptophan 0.20%, Threonine 0.44%, Crude fat 4.2%, Crude fiber 1.8% Ash 2.5%, Calcium 0.05%, Total phosphorus 0.30%, and Non phytate phosphorus: 0.10% (Murakami *et al.*, 2009).

Feeding trials have shown that (Medugu *et al.*, 2010a) the cereals have no significant differences in daily feed intake (94.00- 100.17g), daily weight gain (34.44- 43.17g) and feed conversion ratio (2.24-2.94) and PourReza and Edriss (1997) conform that all the dietary maize portion of broilers can be replaced with millet or sorghum. Ibitoye *et al.* (2012) fed white and red millet varieties with maize as a control diet in broilers and reported mean final weight gain (111.62-170.58), mean feed intake (466.88- 535.62) and feed conversion ratio (3.09- 4.18) and the values are statistically similar ( $P>0.05$ ). Bashar *et al.* (2012) fed maize, millet and sorghum to broilers and reported significant difference ( $P<0.05$ ) in feed intake (45.26-47.49g), final body weight (484.08-587.76g), body weight gain (427.53-531.76g) and feed conversion ratio (2.49-2.98) in the starter phase but the values in the finisher phase were feed intake(132.80-135.72g), final body weight (1826.52-1967.52) and feed conversion ratio (2.94-2.97) and the values were statistically similar ( $P>0.05$ ). Pearl millet (1.89) showed significantly ( $P<0.01$ ) showed a significant better feed conversion efficiency than maize (2.49) in an experiment in broilers fed from 2 – 6 weeks of age (Raju *et al.*, 2003).

The complementary nature of the two cereals fed to broilers revealed no significant difference in live weight(2000.00-2250.00g), slaughter weight(1933.33-2188.33g), pluck weight(1874.82-2121.11g), dressed weight(1470.43-1708.17g) and dressing percentage(73.52-75.92) ( $P>0.05$ ) (Medugu *et al* 2010b). The cuts of parts revealed no significant difference in head (2.36-2.38%), shanks (3.00-4.15%), neck (4.94-5.12%), wings (8.76-9.45%), thigh (13.00-13.16%), drumstick (9.31-10.25%) and thorax (9.90-10.14%) (Medugu *et al.*(2010b). Similarly the organs weight (%) has no dietary effect on the energy sources in the heart (1.10-1.18%), full gizzard (10.02-10.85%), and liver (7.03-7.74%) ( $P>0.05$ ) (Medugu *et al* 2010b). However Ibitoye *et al.*(2012) reported a significant difference of organs weight of broilers fed the cereal sources in the proventriculus (0.05-0.10%), lungs (0.04-0.07%), small intestine(0.23-0.27%), large intestine (0.32-0.61%) and liver (0.22-0.30%) ( $P<0.05$ ). Raju *et al.* (2004) reported no difference ( $P<0.05$ ) weight of gizzard and giblets, length of small intestine, caeca and large intestine among the treatment groups in weight by weight replacement of maize with pearl millet with or without enzyme supplementation (1 kg/tonne of feed).

Field trials in which the two or more cereals were fed to broilers revealed the differences in the hematological parameters as it affected RBC (1.82-3.10, PCV (20.00-31.67%), Hemoglobin (4.07-6.83) and mean corpuscular value (97.13-119.20) ( $P<0.05$ ) (Medugu *et al.*2010b). Similarly mean corpuscular hemoglobin (18.06-22.76), white blood cells (4.28-5.13), monocytes (6.67-13.67), lymphocytes (41.67-48.00), basophiles (0.00-2.00), Neutrophils (33.00-43.00) and eosinophils (6.33-8.67) were statistically significant ( $P<0.05$ ) (Medugu *et al.*2010b). Serum biochemical indices of broilers fed maize, millet and sorghum affected total protein (16.00-34.00), globulin (2.00-20.00), sodium (147.50-160.00), potassium (4.40-5.60), alkaline phosphatase (137.50-187.00) and bicarbonates (16.50-19.50) ( $P<0.05$ ) (Medugu *et al.* 2010b). In contrast Rama Rao *et al.* (2003) reported that the concentration of triglycerides and

HDL cholesterol were not altered due to total replacement of maize with pearl millet at 21 days of age of broilers. However, at 42 days of age, the serum HDL cholesterol concentration significantly decreased ( $P < 0.0$ ) when pearl millet was used as the sole source of energy.

Economics of production of different feed trials showed that there was a reduction in the feed cost, total feed cost and cost per kg gain when millet replaced maize in broilers ration (Elangovan *et al.*, 2003; Medugu *et al.*, 2010a; Etuk *et al.*, 2007; Etuk *et al.*, 2012; Ibitoye *et al.*, 2012).

### Conclusion and recommendation

The complementary nature of maize and millet as energy sources in feeding broiler chickens in Nigeria can be encouraged as it does not affect most of the growth parameters, carcass yield, gut characteristics, this will reduce the feed cost and diversify the feed ingredients used as an energy feedstuff.

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