UTILISATION OF MILLET AND SORGHUM IN PLACE OF MAIZE IN BROILER CHICKEN DIETS: A REVIEW

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ABSTRACT
Maize is the major source of energy constituting 50-60% in poultry diets and has a greater acceptance. However, inadequate production of this grain and the intense competition for maize between man, industries and livestock especially in the tropics has pushed its price to an alarming height, making poultry products to be expensive. The nutrients profile for maize, sorghum and millet are crude protein (7.0, 8.0 and 10.0% min), metabolizable energy (3350, 3288 and 2560 kcal/kg min), crude fibre (3.0, 5.0 and 8.0% max) and ether extract (4.0, 3.0 and 4.0% max) respectively. Several experiments conducted have shown that there was no significant difference in most of the performance parameters among the three energy sources. This review revealed that performance of broiler chickens were not affected by the dietary levels of sorghum and millet. Sorghum and millet are suitable alternatives to maize considering their cost, availability and nutritive value. It is therefore concluded that sorghum and millet could effectively replace 100% maize in the diets of broiler chickens without compromising performance and even with a reduction in cost of production.
Key Words: Broiler Chicken, Maize, Sorghum, Millet and non-conventional

INTRODUCTION
Poultry plays significant role in the provision of animal protein required by man to meet his daily protein intake. However, in commercial poultry production the main constraint is the feed cost which account for about 65- 75% of the total cost of production (Medugu *et al*., 2011). In terms of total cost, energy is the most expensive item in poultry diets, because of the amount required. Maize is the major source of energy in poultry feeds and constitute 50-60% of broiler chickens ration (Ojowola and Olugbemi, 2011). Maize also has a greater acceptance in poultry feeds (Panda *et al*., 2010), its serve also as staple food for good proportion of Nigerians. However, the competition between man, industry and livestock has continued to push the price higher, thereby, causing instability in the poultry industry. Its production is also not sufficient to meet the ever increasing demand of poultry industry (Ani *et al*., 2013). Thus, it is imperative to search for suitable alternative sources of energy in poultry feeds to reduce the cost of production. Among cereal grains, millet and sorghum are the relatively cheaper promising grains that can be successfully utilised as a component of poultry rations. Millet is a possible alternative that can replace maize at 100% in broiler ration (Abubakar *et al*., 2006). It has been indicated that millet is superior to maize and sorghum in protein content (table 1) (NIAS, 2018). Sorghum is another cereal crop that can be used to replace maize to reduce the cost of poultry production (Etuk *et al*., 2012). Alternative sources of energy will reduce the cost of feeds, improve protein availability and intake, increase efficiency of broiler production and improve the profit margin of the poultry producers. The aim of the review is to evaluate performance and economic gain of broiler chickens fed with millet or sorghum based diets and compared it with the performance of birds fed with maize based diets.

Table 1: Proximate Composition of different Energy Sources

Energy	Crude Protein %(min)	Ether Extract%(max)	Crude Fibre%(max)	ME(kcal/kg)(min)
Maize-White	7.0	4.0	3.0	3350
Maize-Yellow	7.0	4.0	3.0	3350
G/corn-White	8.0	3.0	5.0	3288
G/corn-Yellow	8.0	3.0	5.0	3288
Millet	10.0	4.0	8.0	2560

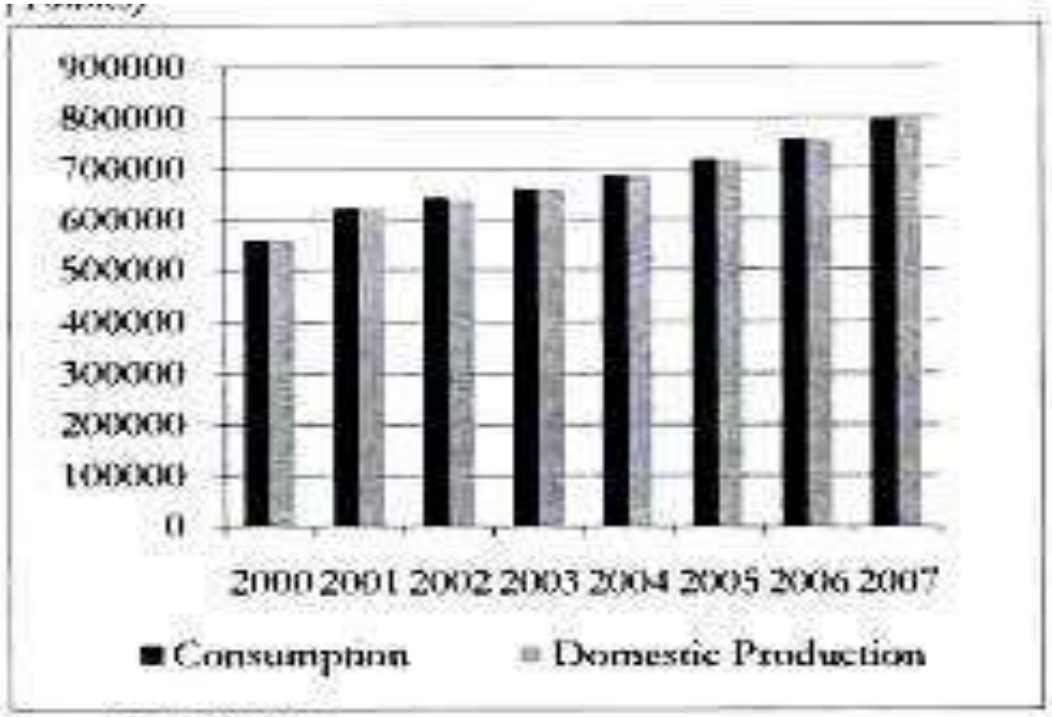
Source: NIAS (2018)

Poultry farming in Nigeria occupies a prominent position as a source of animal protein supply to the citizen. Over the years the growth of poultry industry has followed a pattern closely dictated by the economic futures of the countries. USDA (2002) reported that commercial poultry production in Nigeria was estimated about USD 800 million. It was recorded that the poultry industry contributed about 25% of the country agricultural GDP (FAO, 2010). Moreover, Nigerian chicken population is about 150, 682 million of which 25% are commercially farmed, 15% semi-commercial, and 60% in back yards: USDA (2002) currently rated Nigeria as the leading country in Africa with respect to eggs production but fourth in broilers production, this report indicated that Nigeria still have to improve on their production with respect to broilers. Moreover, since feed cost make up about 70% of the total cost of intensive production systems, the available of cheap feeds is one of the most important factors for poultry industry development. FAOSTAT (2012) data shows that Nigeria's domestic poultry production has supplied close to 100 percent of the country's consumption, both before and after the 2002 import ban (Figure 1).

RESULTS AND DISCUSSION

Cereal and by Products are the main energy source in commercial poultry diets. During recent years price of cereals, particularly maize increase sharply since its use for biofuel production. Maize a conventional dietary energy source is the most expensive ingredient in poultry feed because of the quantity required for inclusion level which constitute about 50-70% of the total ingredients in poultry ration, consequently a stiff competition between man and livestock for the available of cereal grain is of the main reason for the high cost of feed which account for 70-80% of total production cost. Thus poultry nutritionist had advocated for the exploitation of cheaper and readily available feedstuffs alternative to the conventional ones. Maize is a common energy source which is highly competed for by man, livestock and poultry. The market price of maize has therefore escalated as a result of this competition.

Figure 1. Domestic Poultry Production & Consumption (Tonnes)



Source: FAOSTAT

There is also the effect of underproduction due to traditional method of cultivation. In addition to the effects of pest and diseases in some areas. Low maize production is also attributed to frequent floods and droughts in some major producing areas (Agwunobi, 1999). The attraction of feedstuffs such as fish meal and Soybean to use as valuable components of poultry diets is because of their high protein content and good amino acid profile. However, current global biofuel mediated increases in the cost of grains as energy sources in poultry feed. Therefore, identification, development and utilisation of potential alternatives are imperative for the sustainability of livestock production. Saidu *et al.* (2014) formulated six (6) iso-nitrogenous and iso-caloric diets containing yellow maize, white maize, Dauro Millet, Pearl Millet, White sorghum and red sorghum as diet 1, 2,3,4,5 and 6 respectively which were fed to Anak 2000 broilers. Feed intake, weight gain, feed conversion ratio did not differed significantly (P>0.05) in all phases of production (table 2).

Table 2: Performance of broiler chickens fed diets with varying energy sources at finisher phase (1-9weeks)

Ingredients	Diets						
	1	2	3	4	5	6	SEM
Daily feed intake (g)	90.56	80.60	94.75	89.82	88.11	85.73	4.01NS
Daily weight gain (g)	24.26	23.73	27.88	24.04	26.61	22.60	1.46NS
Feed conversion ratio	2.35	2.37	1.96	2.22	2.07	2.17	0.096NS
Mortality	2	2	0	1	2	0	-

NS - Not significant SEM - Standard error of mean

Source: Saidu *et al*. (2014)

CONCLUSION AND RECOMMENDATION

It can be concluded that millet or sorghum could be safely incorporated in replacement of maize in broiler chicken diets. Millet or sorghum can effectively replace 100% maize in the diets of broiler chickens without compromising performance. Hence, based on chemical composition and potential feeding value, it is recommended these products can be incorporated in the poultry diets to economise the feed cost and to increase the profit margin for the poultry farmers.

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