PROMOTING BACKYARD BROILER PRODUCTION AMONG FARMERS USING SORGHUM-BASED DIETS IN GARUN-MALAM LOCAL GOVERNMENTS, KANO STATE, NIGERIA

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ABSTRACT

This study was conducted in Dakasoye Village, Garun-Malam Local Government, Kano State, Nigeria with the aim of enhancing broiler production in the area using locally available ingredient (sorghum) for improved income, job creation and better utilization of available feed resources among others. A 3-stage sampling procedure was used to obtain data from 120 respondents through structured questionnaire and interview schedule. Majority were males (98.4%), married (83.3%) with secondary education (73.3%). Mean age of 49 years (92.5%), household size of 7 persons (81.2%) and flock size of 126 broilers birds (74.2%) respectively. Average monthly income of the clienteles of N54,250.50k, mean farming experience of 9 years (84.2%) and no presence of extension services around the study area (91.7%). Main sources of knowledge of sorghum diet is co-farmers'/farmers' groups (96.7%), family/friends/neighbours (90.8%) and radio program (85.0%). The perceived economic benefits of sorghum diet for broiler feed are ease of substitution for corn and carcass quality, quantity, leg & thigh yield, villi height, abdominal fat are not affected with its use for feed making (100.0%). Main constraints to utilization of sorghum diet for broiler production are inadequate extension services ($\bar{}$=2.57), inadequate advocacy on the accrued benefits of sorghum ($\bar{}$=2.54) and low literacy level ($\bar{}$=2.49) amongst others. It was recommended that proper awareness mechanism should be put in place to help more on advocacy, advisory services training should be instituted to build the capacity of the clienteles on the benefits accrued to sorghum as well as its inclusion levels in both broiler starter and finisher mash. Extension services should be strengthened, made pro-active and put in place in order to discharge its duties effectively.

Keyword: Promoting, Sorghum-Based, Garun-Malam, Poultry-diet, Backyard

INTRODUCTION

The livestock production industry is one of the main employers of labour, a source of livelihood and animal source of nutrients for many families in Nigeria both in the urban, sub-urban and rural areas. According to FAO (2019) the most critical issues in the global food crisis is the dearth of animal protein in most West African countries (Nigeria inclusive). Over the years, the contribution of the livestock subsector to Nigerian Gross Domestic Product (GDP) has decreased from 5.61% in 1960 to about 2.64% in 2010 and the contributions of livestock to the nation's agriculture in 1999 and 2010 remained at 2.64% (Abubakar, 2016; FAO, 2019). This contribution is grossly insignificant and portrays how animal farming has been given adequate attention to contribute its quota to Nigeria's development despite the numerous roles it can play in poverty alleviation and job creation, among others.

Poultry production as an aspect of livestock production is important to the biological needs, economic and social development of the people in any nation (Ahiwe, et al 2014; Attia, et al 2017). Poultry plays very vital role in enhancing the economics as well as social wellbeing of people considering the enormous contributions it renders in terms of income, job creation and availability of protein among many others. It is the main domestic safety net to the rural farm families and a store of assets. Poultry industry occupies a good position in the livestock sector of any economy because of its enormous potential in bringing rapid economic growth especially in the rural areas. The importance of the poultry sub-sector is chiefly in the provision of meat and egg as well as the provision of employment either directly or indirectly and the contribution to the revenue of the country. Within the agricultural sector, the poultry sub-sector had been recognized as the most promising (Batonon et al, 2015). The poultry industry in Nigeria currently has about 10% of the population, and is responsible for less than 15 to 18% employment opportunities, due to the fact that the industry is mainly subsistent (Ahiwe *et al,* 2014).

Among Nigerians, poultry meat to some extent is considered luxury foods. This meat is only obtained enormously from broilers with its high feed conversion ratio than other types of birds. In the rural areas - where household incomes are significantly lower than the national average, consumption of poultry is reserved for special occasions. Usually the source of eggs and poultry meat consumed is from the stocks kept by the households. The amount of eggs and meats available from this source is usually limited by the low level of productivity of free-range birds (FAO, 2012). Poultry provides humans with companionship, food and fibre in the form of eggs, meat and feathers. Many people love to raise, show chickens and other poultry species at fairs and other poultry shows. Others just love to raise them as backyard pets and for fresh eggs/meat daily. Globally, there are large commercial chicken industries that provides us with eggs and meat (Michael, 2017).

Poultry production in Nigeria is facing myriad bottlenecks over the decades, one of which is the shortage of and subsequent high prices of feed energy diets. The cost of feed in poultry production constitute up to about 70 to 80% of total production cost and out of which about 95% is meant for meeting the energy and protein requirement of the diet (Wesley 2015). Increase in the prices of maize as a main ingredient and its competition for human diet has led to scarcity of the crop for livestock use (Agbabiaka *et al*., 2013; Abdulkadir, Na-Allah & Bala, 2014). This has necessitated the need for alternative to maize in poultry feed production especially broilers that requires very high energy. The high cost of maize in Nigerian markets has affected profitability of broiler production negatively and thus, resulted in inadequate protein intake among Nigerians. This necessitates the need for cheaper and available cereal feed ingredients that can meet the energy requirement of the birds which constitute over 40 per cent of the feed composition (Mohammed, Urge & Gebeyew, 2015; MFA, 2020). A possible way to reduce poultry production costs is finding alternatives to conventional carbohydrate sources that are efficient, inexpensive and locally available.

Sorghum (*Sorghum bicolor* (L) Moench) which belongs to the tribe Andropogoneae (FAO, 2012) and family poaceae is known as guinea corn in West Africa and locally called Okababa, Dawa, and Okili in three major languages of Nigeria (Adegbola, et al, 2013) is a good alternative. Sorghum is the fifth most important cereal in the world in terms of production and acreage after maize, rice, wheat, and barley with an annual production of about 57 million tonnes. Nigeria is the largest producer of the crop with an annual production of 6.9 million tonnes (FAO, 2019; Hafez & Attia, 2020) and thus the most important cereal grain in the country. Sorghum was identified as the major

crop that can easily replace maize because of its similarity in composition with maize (Dinani et al, 2019). Sorghum is of utmost importance in poultry feed production in countries where it is readily available. Sorghum grain is an interesting energy ingredient in poultry diets due to its nutritional composition, which is very similar to corn. Broilers can be fed up to 70% low-tannin sorghum in combination with soybean meal, minerals and vitamins (Michael, 2019). Low-tannin sorghum has a metabolizable energy comparable or higher to that of maize (Ahmed, Dousa & Abdel, 2013; MFA, 2020), and can replace maize grain to a great extent (Wesley, 2015). Tannin-free cultivars are preferred by poultry, but it is possible to feed them with high-tannin sorghum, provided it is reconstituted after high-moisture storage for 10 days.

Feed is responsible for about two thirds of broiler production costs and, therefore, it is a key factor for the profitability of broiler production (Ahmed, Dousa &Abdel, 2013). The potentiality of sorghum to grow in places where maize may not do very well due to the shortage of rainfall gives sorghum an added advantage over maize because sorghum requires an average rainfall of 400mm and takes about 85 to 140 days to mature compared to maize that requires 800 to 1200mm of rainfall and matures in 80 to 110 days or 110 to 140 days for early and late maturing varieties respectively (Abdulkadir, Na-Allah, & Bala, 2014). This is why sorghum can thrive and do well in areas like Kano Northwest, Nigeria. It is on this backdrop that the study seeks to examine promoting backyard broiler production among farmers using sorghum-based diet in Garum-Mallam Local Government Area of Kano State, Nigeria. The specific objectives are to;

1 describe the socio-economic characteristics of the farmers,
2 examine the perceived economic benefits of sorghum based ingredient over maize;
3 determine the respondents' sources of knowledge on sorghum-based ingredient;
4 identify the constraints of the respondents to using sorghum-based ingredient;

METHODOLOGY

Study Area

This study was carried out in Dakasoye Garun-Malam Local Government Area of Kano State, Nigeria. Garun-Malam is under the ADP zone I and has a land area of 214 km² and a population of 116,494 at the 2006 census (National Population Commission (NPC, 2006). The area falls within the Sudan savannah agro-ecological zone of Nigeria. Inhabitants of the village are majorly farmers engaged in crop and animal production. They grow crops such as sorghum, rice and maize. They also keep mini and macro livestock in such as poultry, sheep, goat and cattle mostly in free range systems.

Kano state lies in the northern part of Nigeria between latitudes 10° 33' to 12° 37'N, and longitude 7° 34' to 9° 25'E. The southern part of the state lies in the northern Guinea Savannah agro-ecological zone while the remaining northern part is covered by the Sudan Savannah. The annual rainfall varies from 600-1200mm in the Guinea Savannah to 300-600mm in the Sudan Savannah. The length of growing periods (LGP) ranges from 90-150 days in the Sudan and 150-200 days in the Guinea Savannah zone. This allows crops like sorghum, maize, groundnut, cowpea, millet, cassava and sweet potato to flourish well under rain fed agriculture. The production of rice, maize, tomatoes, onions and pepper is increasing as a result of development of irrigation schemes scattered within the state.

The 2006 population census estimates Kano state population at 9,383,683. Using the annual growth rate of 3.2% the projected population of Kano state by the year 2016 could be 12,686739. Tomato consumption is popular among the teeming population of Kano state.

The major tribes are Hausa and Fulani ethnic groups but other ethnic groups inhabiting the state include almost all major and minor tribes in Nigeria. Other Nationals from different continents of the world are also found in Kano. This brings about different culture, norms, values and preferences as well as different consumption pattern. However, majority of this population prefer fresh form of the tomatoes. The State has 44 local Governments Areas and is classified into three Agricultural Development Programme (ADP) zones by Kano state Agricultural and Rural Development Authority for the purpose of extension service delivery. The zones are three ADP Zones: I, II and III. Each zone comprises of a number of Local Government Areas (LGAs).

Zone I: Rano, Tudun Wada, Doguwa, Bebeji, Kiru, Garun mallam, Kura, Kumbotso, Madobi, Gwarzo, Karaye, Rogo, Kibiya and Bunkure, with the zonal headquarters at Rano.
Zone II: Danbatta, Bichi, Bagwai, Shanono, Tsanyawa, Kunchi, Kabo, RiminGado, Tofa, DawakinTofa, Makoda, Minjibir and Ungogo, with the Zonal Headquarters at Danbatta.
Zone III: Gaya, Ajingi, Wudil, Albasu, Garko, Takai, Sumaila, Dawakin kudu, Warawa, Gezawa, Gabasawa, Kano municipal, Gwale, Tarauni, Dala, Fagge and Nassarawa, with the Zonal Headquarters at Gaya.

Sampling Procedure and Sample Size
A multistage (3-stage) sampling technique was used in selection in the study area. The first stage involved a purposive selection of Garun-Malam Local Government Area from 14 LGAs in the ADP zone I Kano State due to the concentration of backyard broiler farmers engaged in using Sorghum-Based Diets for broiler feed making. The second stage of sampling involved a purposive selection of three (3) villages from the list of villages in the Garun-Malam Local Government Area with high concentration of broiler producers. The villages selected were: Gun Dutse, Imawa, and Karfi villages respectively. At the third stage, from the list of broiler farmers in the 3 village areas 40 respondents were randomly selected using simple random selection procedure through the list of registered broiler farmers obtained from Kano state Agricultural and Rural Development Authority-KNARDA (Bello, et al 2017) to make a sample size of 120 respondents for the study. The data obtained was analysed using descriptive statistical tools like: Mean, Frequency Counts, Percentages, Standard Deviation, Tabulations and Likert Type Scale.

RESULTS AND DISCUSSION

Table 1: Distribution of the respondents based on socio-economic characteristics

Variables	Frequency	Percentage	Mean ( )±SD
Sex			
Male	118	98.4	
Female	2	1.6	
Age (years)			49.2±7.0
0-20	1	0.8	
21-40	7	5.8	
41-60	111	92.5	
>61	1	0.8	

Educational Qualification			
Primary	5	4.2	
Secondary	88	73.3	
Tertiary	10	8.3	
No formal	17	14.2	
Marital Status			
Single	17	14.2	
Married	100	83.3	
Divorced	2	1.6	
Widowed	1	0.8	
Farming Experience (years)			
0-5	5	4.2	8.6±2.9
6-10	101	84.2	
11-15	8	6.7	
>16	**6**	**5.0**	
Household Size (No)			
0-5	20	16.7	7.1±2.3
6-10	98	81.2	
>10	2	1.6	
Flock Size (No)			126.20±11.23
0-100	30	25.0	
101-200	89	74.2	
>201	**1**	**0.8**	
Average Monthly Income (N)			
1-20,000	1	0.8	54,250.50
21,000-40,000	1	0.8	
41,000-50,000	3	2.5	
51,000-60,000	114	95.0	
≥ 61,000	1	0.8	
Presence of Extension			
Yes	10	8.3	
No	110	91.7	

Source: Field Survey, 2021. SD=Standard Deviation

Socio-economic Characteristics of the Respondents

Table 1 shows the result of the socio-economic characteristics of the broiler farmers in the study area. Majority of the farmers were males (98.4%), while the remaining were females (1.6%). This implies that males are mostly involved in broiler poultry farming than their female counterparts in the study area. It implies that men were more involved in exotic chicken farming than women which might be as a result of it high profitability, ease of handling, quick return on investment as well as being a dependable means of livelihood for taking care of their families. This is in line with the assertion of Thompson and Aturamu (2018) who opined that only about a quarter of the farmers sampled in the study area involved in agriculture were female. The mean age of the respondents is 49 years (92.5%). This implies that the respondents are in their active and productive age range where energy is highly needed for poultry farming activities. This is in line with the work of Obisesan, *et.al.*, (2013), who pointed out that the active age is regarded as agile with more energy to dissipate and concentrate on productive efforts. Greater proportion of the respondents were with secondary education (73.3%), to no-formal education (14.2%) and tertiary education (8.2%). This implies that the respondents were not really educated judging from their educational levels, but only very few were educated to tertiary level. This implies that majority of the respondents were moderately literate and hence stands the chance of understanding the accruing benefits of improved innovations on broiler farming practices and this would assist their information seeking habits as asserted by Ogunlade, *et.al,* (2010). Majority were married (83.3%) with average farming experience of 9 years (84.2%). This corroborates the ascertain of Bello, et al., (2017) that, the higher the farming experience the more the farmers would have gained more knowledge and innovation in handling broiler farming activities and the higher would be their output and income on the long run. Mean household size of 7 persons (81.2%) and flock size of 126 birds (74.2%). This implies that the respondents in study area are small scale farmers. House size implies available manpower for labour which in turn translated to lesser money spent on hired labour for taking care of all the rigorous work in poultry production. The average monthly income accrued from broiler production is N54,250.50k per month (95.0%), which implies that the broiler business is profitable and worth doing. There is no presence of extension services (91.7%) which saddled with responsibility of bringing improved practices and innovations to the clienteles in the study area. This implies that many improved innovations on broiler diet and management may not be reaching the clienteles in the study area.

Table 2: Distribution of the respondents based on source of knowledge on sorghum based diet for broiler feed

Variables	Frequency	%	Rank
Newspaper	39	32.5	6th
Extension Agents//Veterinary Service	51	42.5	5th
Film Show on Agriculture	69	57.5	4th
Co-farmers/Farmer's Group	116	96.7	1st
Family/Friends/Neighbors	109	90.8	2nd
Television Agricultural Program	51	42.5	5th
Radio Program	102	85.0	3rd

Source: Field Survey, 2021

Respondents' Sources of Knowledge on Sorghum based Diet for Broiler Diet

The respondents' sources of knowledge on sorghum based diet for broiler feed production is shown in Table 2. The most significant sources of knowledge on sorghum based diet for broiler feeds is Co-farmers'/farmers' groups (96.7%). This may be unconnected to the fact that in farmers group there is frequent communications through individual contact procedures and this seemed more effective and very fast. This is in line with the submission of Ahmed, Okorie and Ezeafulukwe (2013) who agreed that farmers obtain more information from co-farmers and groups on broiler feed production. Next to this is family/friends/neighbours (90.8%). This medium could be best because it exhibits frequent and continuous contact between individuals especially farmers. Radio program (85.0%) is another medium to which the clienteles obtain their knowledge on broiler management and agricultural practices. This is because radio program transmission covers wider range of land mass and it is very common and relatively cheap to acquire. The respondents also obtain information on sorghum based diet for broiler feed production from agricultural film shows (57.5%) as well as television program (42.5%). Television programs may not cover wider areas because of its availability, infrastructural problems associated with it functioning and cost of acquisition and maintenance. Extension agent/veterinary services (42.5%) saddled with responsibility of disseminating improved practices and innovations to farmers is not living to its' expectations. Newspaper (32.5%) is the least and this is because the respondents are not really literate to take reading newspapers as routine activities that can give them valuable information on their means of livelihood.

Table 3: Distribution of the respondents based on economic perceived benefits of sorghum based diet for broiler diet

Variables	Frequency	Percentage
Easily substitute corn due the nutritional & energy content	120	100.0
Maturity and growth are similar to corn diet when used well	110	91.7
It does not affect the performance/morphometric of the GIT of broiler	96	80.0
Performance same with corn based ingredients when used optimally	108	90.0
Gizzards and small intestine were heavier when used in diet than corn	85	70.8
No detrimental effects on performance of broilers	89	74.2
No effect on live weight, feed conversion ratio and liveability	91	75.8
Only sorghum diet with low tannin content is suitable for use	66	55.0
Carcass yield & quality, leg &thighs yield, villi height, abdominal fat, are not affected by the use	120	100.0

Source: Field Survey, 2021 multiple respond allowed

Respondents' perceived economic benefits of sorghum based diet

The respondents perceived economic benefits of sorghum based diet for broiler feeds is indicated in Table 3. Corn based ingredients may be too expensive because of competition with human consumption and difficulty to accessing. Sorghum based diet for broiler feed manufacturing holds some economic benefits to both farmers and the birds themselves. Among

the array of benefits identified by the respondents on the use of sorghum based diet for broiler feed making are that it could easily be used to substitute corn based ingredients due to its' nutritional and energy content as well as the fact that carcass yield/quality, leg & thigh, villi height, abdominal fat is not affected (100.0%) by the use of sorghum based diet for the production of broiler feed. Maturity of broilers and growth are much comparable with those of corn based ingredients (91.7%) when used at correct proportion. Also performance of broilers fed with sorghum based diet are same with corn based diet (90.0%). Same as the performance the morphometric of the gastro intestinal tract of the broilers (80.0%). It similarly does not affect the live weight, feed conversion ratio, feed to weight gain ratio and liveability of the broilers (75.8%). It has no detrimental effects on the broiler on longer usage (74.2%) while slightly above average (55.0%) agreed that sorghum based diet with low tannin content is the only suitable type for use in making broiler feed. This is in congruent with the work of Adamu, *et al,* (2012) who agreed that there are enough economic benefits in the use of sorghum for broiler feed production.

Table 4: Distribution of the respondents based on constraints to utilization of the sorghum based diet for broiler feed production

Variables	Severe	Undecided	Not Severe	$\bar{x}$
Lack of understanding of the inclusion level	53(44.2%)	41(34.2%)	26(21.6%)	2.23
Inadequate capital for future storage	55(43.7%)	43(34.1%)	22(22.2%)	2.28
Lack availability of the product to majority of broiler farmers	65(54.2%)	38(31.7%)	17(14.2%)	2.40
Poor infrastructural facilities of the study area	62(51.7%)	38(31.7%)	20(16.6%)	2.35
Inadequate extension service contact	84(70.0%)	20(16.7%)	16(13.3%)	2.57
Inadequate advocacy on the benefits of using kaura sorghum ingredients	75(62.5%)	35(29.2%)	10(0.08%)	2.54
Unavailability/scarcity of sorghum due to usage for industrial purposes	57(47.5%)	43(35.8%)	20(16.6%)	2.30
Over dependence on commercial feed	10(0.08%)	30(25.0%)	80(66.7%)	1.42
Low level of literacy	76(63.3%)	27(22.5%)	17(14.2%)	2.49

Source: Field Survey, 2021

Respondents' Constraints to Utilization of the Sorghum based Diet for Broiler Feed Production

The respondents' constraints to utilization of sorghum based diet for the production of broiler feeds for their chicken in the study area were indicated in Table 4. The constraints of the respondents to the utilization of sorghum based diet for broiler feed production was measured on a 3 point likert type scale of Severe=3, Mild=2 and Not Severe=1. Mean value ( ) was calculated from 3+2+1/3=2.00. mean value obtained was used for judgement. Therefore, mean value of ≥2.50 is Severe while ≤1.44 is not severe. Therefore, the most severe constraint to utilization of sorghum based diet for broiler feed production are inadequate extension service contact (=2.57), inadequate advocacy on the benefits of using sorghum based diet (=2.54) and low level of literacy (=2.49) respectively. Mild constraints to the utilization of sorghum based diet are lack availability of the product to majority of broiler farmers (=2.40), poor infrastructural facilities of the study area (=2.35), unavailability/scarcity of sorghum due to usage for industrial purposes (=2.30), inadequate capital for future storage (=2.28) and lack of understanding of the inclusion level (=2.23). while only over dependence on commercial feed (=1.42) was not seen as a severe constraint among the respondents in the study area. this is in consonance with the view of Dinani, *et al* (2019) who posited that the main constraints to the use of sorghum for feed making of chicken is lack of advocacy on the inclusion rate and proximate composition.

CONCLUSION:

The research concluded that the main source of knowledge on sorghum based diet for broiler feed is co-farmers/farmers' group (96.7%). The perceived economic benefits of sorghum based diet for broiler feed are that it is easily substituted for corn and the carcass properties of the broilers are not affected (100.0%). Major constraints to utilization of sorghum based diet for broiler feed making are inadequate extension services (=2.57), inadequate advocacy on the benefits of sorghum based diet (=2.54) and low literacy level of the respondents (=2.49). Sorghum has lower price in the study area and contains almost the same nutritional value as maize, it therefore can play role in minimizing feed cost in backyard broiler keeping. This might lead to increased income generation, job creation, protein uptake among other things.

RECOMMENDATIONS:

The following recommendations can be adduced from the study:

1. Proper and more awareness campaign should be instituted in the study area to help the respondents be abreast of the benefits accrued to the white sorghum as a good substitute for maize.
2. Extension service component of the state ministry of agriculture should be strengthened and equipped to be more available to the respondents in the study area.
3. Periodic trainings should be organized by development partners and farmers' groups to help the knowledge of farmers on the advantages of better substitute for maize to avoid people leaving poultry business for other lucrative jobs.
4. Farmers in the study area should embrace backyard broiler production for improved income and job creation. Also, sorghum could be used as a source of energy in birds' ration for reduced feed cost and increased profit looking at the perceived economic benefit of sorghum based diet.

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