

Full length Research paper

An assessment of some production and management profile of indigenous chickens of Bekwarra Cross River State, Nigeria

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Accepted 5 July, 2019

A study was conducted in Bekwarra, Cross River State-Nigeria, to assess the production and management profile of indigenous chickens. A total of 208 households were painstakingly sampled across seven administrative council wards of the local government. Data obtained were subjected to Statistical Package for Social Science (SPSS) analysis. Results showed that majority of indigenous Nigerian chickens are reared and survive under traditional scavenging system (64.40%), semi-intensive (29.80%) and (5.80%) intensive management system. They depend on weed seeds, crop residue and insects for growth, maintenance and production. Insects account for 3% of local chicken diet in extensive production model without compromising performance. Local birds under extensive system lay up to 3 clutches of 15 eggs per clutch and 45 eggs per hen per year. The predominant poultry diseases of local fowl were; Newcastle (47.70%) Infectious bursa disease 25.50%, Chronic respiratory disease (13.00%) and Fowl pox (8.70%). Mean mortality rate was $34.8 \pm 0.7\%$. Women owned 50.50%, men 30.30% and 19.20% of the chickens were owned by children respectively. Shelter construction for birds under intensive and semi-intensive system were carried out by men (75.50%), 17.80%, children and 6.70%, women. Water and feed supplement were provided by women 83.20%, children 11.50% and men 5.30%. Sanitation was carried out by women 53.80%, children 37.70% and men 8.20%. Live birds and poultry product were sold by women 47.10%, children 37.00% and men 15.50%. Bird sorting, brooding, and treatment were performed by women 74.60%, men 38.90% and experienced children 13.50%. The mean population of hen, cock, growers and chick owned per house hold were 5.1 ± 0.09 , 3.4 ± 0.02 , 4.1 ± 0.04 and 3.8 ± 0.03 respectively. Average live weight value of matured birds were $1.5 \pm 0.05\text{kg}$ hens and $2.0 \pm 0.01\text{kg}$ cocks. The community survive mostly on livestock and crop production. 45.20% of the population were engage in crop and livestock production, 25.00 agribusiness, 15.30 civil servants, 5.80 self-employed, 5.30, and 3.40 fishing and 3.40% were students. They grow groundnut (36.10), 25.50 cassava, 16.80 yam, 8.70 maize, 6.70 rice and (2.40, 1.90, and 1.80%) grows cowpea, sorghum, and millet respectively. Low productivity in local fowl is due to poor management, nutritional deficiency, disease, parasitic attacks and low genetic potential. Uncontrolled contact between different flocks and scavenging in extensive and semi intensive production models increases disease prevalence leading to reduced egg production, body weight, and increased mortality and morbidity. No housing in extensive system expose birds to (harsh environment, disease factors, predators, theft and accident). Semi intensive system afford birds of moderately balance housing, health care and nutritional needs for better performance. Locally adapted chickens are not use to confinement. Majority of birds in total scavenging system come down with vitamin deficiency, and lack required nutrients for growth, maintenance and production. Therefore, providing shade at scavenging areas, health care, water and supplementary feed under extensive and semi intensive conditions could improve bird comfort and productivity.

Key words: Assessment, Production, Management profile, Indigenous chickens and Bekwarra.

INTRODUCTION

Indigenous chickens constitute 80% of the 120 million poultry birds found in Nigeria leaving Guinea fowl 11.20%, duck 5.70%, turkey 2.00% and others 1.10% (RIM, 1992; Daikwo *et al.*, 2011). Interestingly, Cross River State, Nigeria produce about 2.36 million poultry birds (CRSMA, 2002). They are commonly distributed across every corner of tropical Africa countries where they are reared by rural farmers. Local chickens are self-reliant, possess ability to incubate and hatch on their own, brood and scavenged for their food, with appreciable immunity from endemic diseases, and can thrive well under inadequate nutrition at different agro-ecological zones Odah., *et al.* (2018). They are hardy, adaptive and preferred by consumers (Kitalyi, 1998). Though their survival is threatened by several factors for example, uncontrolled cross breeding with exotic breed, parasitic attack and disease. They are also readily available to resource poor farmers and can be productive without high disease-control inputs Dunya *et al.* (2015) This implies designing efficient production and management system for locally adapted animals in the tropics can improve productivity and level of income generation for farmers.

About 80% of poultry meat in Nigeria comes from the free range low input production and management system (Paul and Islam, 2001). They contribute more than 4.3% of the total animal protein consumed in Africa FAO, (2002). Their products are preferred by majority of Nigerians because of the good taste, leanness and suitability for special dishes (Nwagu, 2002). These products (egg and meat) are readily available to rural and urban dwellers and serve as a rich source of animal protein in diets. They survive significantly on crop residue, weed seeds, insects, kitchen and agro- industrial waste (Atteh, 1990). Its production is popular in most rural areas as high cost of formulated feed, health management, lack of electricity and poor brooding technique limits industrial poultry production. Local chickens are however important as it account for nutritional needs of the family, small cash flow reserve during celebration from the sales of eggs, meat and live birds. They are also useful for religious and recreational purposes and can be harnessed for rural poverty reduction. They are kept to supplement meals, honor guest as gifts, supply manure for crops and to serve as a means of checking time (Nwagu, 2002). Some are potential egg producers, while others are known for their excellent meat quality and or for dual purposes.

Native chickens can adapt conveniently to different ecological conditions. Its production and management system in tropical African countries varies widely with farmers, households and ecological zones. Oluyemi and Roberts, (2000) distinguished three management systems: intensive, semi-intensive and extensive systems

in poultry production. Two management models; semi-intensive for subsistence and intensive management for commercial birds are widely practiced in Rivers state, Nigeria Dunya *et al.* (2015). The type of management system adopted, directly influence the production strength of birds. Otecheere *et al.* (1990) observed low clutch number and size for chickens reared under total scavenging condition in Nigeria. Omeje and Nwosu (1983) reported high performance both in clutch number and size per hen per year. Evidence in previous literatures reveal that the indigenous Nigerian fowls under traditional scavenging system can lay up to 3 clutches of 12-18 eggs per clutch and 36-50 eggs per hen per year (Sonaiya, 2000; Uza *et al.*, 2000 and Mancha, 2004). More than 75% of the total local chickens in tropical African countries are reared under semi-intensive and extensive management systems.

Despite high demand for indigenous chicken as valuable genetic resource, nutritious food and reliable source of income, there is paucity of information on its best production and management systems in the livestock industry especially in Bekwarra, Cross River State, Nigeria.

MATERIALS AND METHODS

This study was conducted in Bekwarra Local Government Area, Cross River State, Nigeria. Cross River State lies within the coordinate (latitude 8°41'N and 14°5'E) with a total population of 4,151,193 and land mass of 69,436km² (NPC, 2001). Bekwarra lies within latitude (6° 41'N and 8° 71'E). It occupies 306 km² with a total population of 105,822 (NPC, 2001). It is a rain forest zone, characterized by minimum temperature of 22.3°C in December which could rise to a maximum of 35.8°C in February, with an altitude of (400-3000mm) above sea level. Rainfall is between 1500-1849.3mm in areas with lower altitude and 1556-1960mm in the high lands areas. It has low intensity of light due to thick forest with relative humidity of 61- 92% (CRSMA, 2002). The vegetation of the zone is a tropical rain forest which favors livestock and crop production which are major activities in the area. Bekwarra Local Government Area has 10 administrative council wards namely: Gakem, Ugboro, Ikparikobo, Nyanya, Abuochiche, Ibiaragidi, Ukpah, Ububa, Beten and Afrike.

Data collection

Well-structured questionnaires were used to collect primary data. Purposive and multistage sampling technique was adopted in selecting respondents. Seven council wards was studied, with four villages from each ward. 4-5 household was sampled per village and available mature chickens (hens and cocks) in the houses were examined. A total of 208 households were randomly sampled across the respective council wards.

Data obtained was subjected to Statistical Package for

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Social Sciences (SPSS, 2006) version 16.0 for descriptive analysis.

RESULTS AND DISCUSSION

Demographic Profile of Indigenous chicken farmers of Bekwarra, Nigeria

Table 1 represent the demographic characteristics of indigenous chicken farmers of Bekwarra, Cross River State, Nigeria. Indigenous chickens are reared in the household level mainly for consumption and income generation (Badubi *et al.*, 2006). The average number of persons per household were 13.4 ± 0.2 comprising of 89.42% Bekwarra, 9.14% Afrike and 1.44% others. The population is an agrarian community that survive mostly on livestock, arable and permanent crop production. About 45.20% of the farmers were engaged in crop and livestock production, 25.00% agribusiness, 15.30% were civil servants, 5.80% self-employed, 5.30%, fishing and 3.40% students. They grow groundnut (36.10%), 25.50% cultivate cassava, 16.80% grow yam, 8.70% farm maize, and 6.70% were engaged in rice production. Few proportion were into cowpea, sorghum, and millet farming (2.40, 1.90, and 1.80%), respectively. The high frequency of groundnut and cassava production in this report is due primarily to its economic potential and high demand for food, by livestock, poultry and man. High proportion of farmers 45.20% observed in this current study might have resulted from the fact that the area is endowed with fertile agricultural land mass that support arable, permanent and livestock production.

According to Food and Agricultural organization (FAO, 2002) farming and trading is the hub of survival for rural communities. They grow cereal and legume crops, roots and tubers and some forest species that supplies food, crop residue and shelter materials to aid man and animal production.

Ownership Pattern and Labour Profile of Indigenous chickens of Bekwarra, Nigeria

The ownership pattern and labour profile of indigenous chicken is described in table 2. In Bekwarra, Nigeria 50.50% of local chickens were owned by women, 30.30 and 19.20% were owned by children and men respectively. Shelter construction for chicken production especially in the intensive and semi-intensive systems were carried out by men (75.50%). Women and children contributed (6.70 and 17.80%). Water and feed supplements were provided in some house hold by women 83.20%, children 11.50% and men 5.30%. Housing and feed equipment cleaning (sanitation) were carried out by women 53.80%, children 37.70% and men 8.20%. Live birds and poultry products were sold by women 47.10%, children 37.00% and men 15.50% where

they are the owner. Birds isolation, sorting, brooding assistance, and treatment of visibly sick birds were performed by women 74.60%, men 38.90% and children 13.50% who are well experienced in the act.

High frequency of chicken ownership (50.50%) by women observed in this study is lower than 70% indicated by Gueye, (1998) and consistent with the findings of Tadella, (2003), and FAO (2002) who reported about (48.4 - 56.2%) for native chicken population in Africa managed under free range low input system. It contradicts Dunya *et al.* (2015) who revealed that (83.6%) of local chickens of Borno state were kept by men and (16.4%) women respectively. This is attributed to the fact that, women rear chicken as a reliable source of income, and meat for food.

It might have resulted also from the fact that women have better knowledge of poultry production and management than men. This indicates that helping women to boost poultry production can increase equitable food distribution in the household and reduction in the level of poverty and dependence.

Women dominating in feeding, selling of live birds and poultry products, treatment, sanitation and water supply in this present study agree favorably with (Kitalyi 1997; Mapiya and Sibanda, 2005) who reported similar findings for indigenous chicken production and management in Ethiopia and Tanzania respectively. Men dominated in shelter construction 75.5% and aided in the selling of poultry product where women and children are not readily available in this report contradict Otecheere *et al.* (1990).

Production and Management systems of Indigenous chickens

The production and management systems of indigenous Nigerian chicken are described in table 3. Good management practice influences the performance of locally adapted tropical animals. Native chickens in Bekwarra Cross River State, Nigeria were reared mostly under extensive management system (64.40%), 29.80% were kept under semi-intensive management and 5.80% were reared on intensive condition respectively. Keeping of indigenous chicken under extensive management 64.4% and semi intensive management 29.8% in Bekwarra, agree with Dunya *et al.*, (2015) who reported 65.8% extensive and 34.2% semi-intensive management for local chickens of Borno State, but lower than 87.2% of (Gueye, 2002 and FAO 2002) for indigenous chicken population of Africa. This is consistent with Kperegbeji *et al.* (2009) who identified three kinds of poultry production system to include; free range low input system, intensive and semi-intensive husbandry system. On the other hand, low percentage of intensive management (5.80%) by farmers in this report is consistent with (Alamaya *et al.*, 2006) who maintained that local chickens are not used to confinement. Rearing chicken under total confinement causes extreme stress (Tadelle *et al.*,

Table 1: Demographic Profile of Indigenous Chicken farmers of Bekwarra, Nigeria

Items	Frequency	Percentage (%)
Tribes		
Bekwarra	186	89.42
Afrike	19	9.14
Others	3	1.44
	n(208)	100.00
Household occupation		
Farming	94	45.20
Trading	52	25.00
Civil servants	35	16.80
Self employed	12	5.80
Fishing	7	3.40
Students	8	3.80
	n(208)	100.00
Main crop produced by household		
Ground nut	75	36.10
Cassava	53	25.50
Yam	35	16.80
Maize	18	8.70
Rice	14	6.70
Cowpea	5	2.40
Sorghum	4	1.90
Millet	2	1.08
	n(208)	100.00

2002) and may result in serious health and production problems (Halima, 2007).

Low output experienced in extensive practice can be attributed to sub-optimal management, lack of supplementary feed, and low genetic potential of birds. Free range production utilizes available cereal grains, crop residue as energy and insects for protein source with no housing. Birds in intensive management are adequately provided with housing and sufficient nutrition for maintenance, growth and production while semi husbandry technique allows for partial supplementation with little housing arrangement at night. This however, suggest that local chicken might survive best and do well under free range production and management system.

Extensive production model with high stocking density allows birds free access to pastures and insects, providing different meat physical-chemical characteristics than conventional chicken meat Kaiser, (1990), particularly relative to texture, color, flavor, and pH. Santos *et al.* (2014) in Brazil showed that providing shade net covering 60% of the scavenging area improve environmental condition and promote better bird comfort. Semi intensive production modules provide artificial shade. This influences the physiological and performance parameters of birds, as a result of better ambient conditions, providing less heat to reared birds. Different production system influences the performance of birds.

Interestingly, intensive production model provides better comfort for birds compared to other models.

Feeds and Feeding of Local Chickens

Feed resources availability is the hub of survival for locally adapted animals and account for 65% productivity in rural poultry production in the tropics. Locally adapted chickens can survive on scavenging system, characterized by low input and low output (Aichi, 1998). They depend on weed seeds, crop residue and insects for growth, maintenance, and production. Evidence shows that 6.2% of small holder poultry farmers in Zimbabwe practice zero supplementation, 96.6% partial supplementation and 0.2% provide needed supplementary feeds for their birds as at when needed Sonaiya (1998). Roberts and Gunaratne (1992) showed that village chicken productivity is determined by the relationship between the biomass of the chicken population and the scavenging feed resource base. Cafeteria choice of feeding were mostly adopted among local chicken farmers practicing extensive management and partly by semi intensive farmers. In this system, maize and sorghum are offered as energy source and the birds scavenge during the day for insect-worms and larva as protein source. This is in line with Atteh and Oblongbela, (1993) who reported that maggot can

Table 2: Ownership and Labor Profile of Indigenous chickens of Bekwarra, Nigeria

Items		Frequency	Percentage (%)
OWNERSHIP OF LOCAL CHICKENS			
Women		105	50.50
Children		64	30.30
Men		40	19.20
		n(208)	100.00
LABOUR PROFILE			
Shelter construction	Men	157	75.50
	Children	37	17.80
	Women	14	6.70
		n(208)	100.00
Supply of water and feed	Women	173	83.20
	Children	24	11.50
	Men	11	5.30
		n(208)	100.00
Sanitation	Women	112	53.80
	Children	79	37.90
	Men	17	8.20
		n(208)	100.00
Selling of birds and eggs	Women	98	47.10
	Children	77	37.00
	Men	33	15.90
		n(208)	100.00
Treatment of birds	Women	99	47.60
	Children	81	38.90
	Men	28	13.50
		n(208)	100.00

efficiently account for 3% of chicken diet without compromising performance. Mapiya and Sibanda, (2005) revealed that scavenging birds in Ethiopia easily come down with vitamin deficiency, and lack required nutrients for growth, maintenance and production. This suggest that feeds and feeding constitute a vital component of growth and production of chickens irrespective of production and management system. Providing supplementary feed, water and health care under extensive and semi intensive condition could improve bird productivity. This is further buttressed by evidence in literatures by (McAinsh *et al.*, 2004 and Dunya *et al.*, 2005) who revealed that majority of local chicken farmers in Nigeria and Zimbabwe feed their flocks.

Housing of Indigenous Nigerian Chickens

No specialized housing structure is designed for local chickens under total scavenging system in rural areas (Bogale, 2008). Small huts roofed with thatch, baskets and boxes were used to provide shelter mostly at night in extensive and partly semi intensive management models in Bekwarra, Nigeria. Majority of locally adapted birds roost on trees, branches, planks, and take shelter under tall grasses, abandoned old cars and uncompleted buildings. Few farmers have constructed houses for local

chickens. Where housing is provided, the houses are made with locally available materials such as wood, mud bricks, sugarcane stems, bamboo and cereal stovers. Farmers may have chosen these housing materials because these are the most abundant and affordable housing materials based on the ecological zones. Although indigenous chicken farmers of Borno, state practice extensive system, almost all the farmers provide some form of overnight shelter for birds either in the kitchen (12.9%), main house (19.2%), with hand woven baskets (38.8%), and in shades 22.3% Dunya *et al.*, (2015). In Botswana, 35.8% of local chicken farmers provide housing for chickens (Badubi *et al.* 2006).

Extensive management system exposes birds to disease factors causing high mortality, harsh environment with inadequate nutritional supplies leading to low productivity. High mortality rate associated with this production model can be attributed to no housing structures making birds vulnerable to predators, theft, and accident.

Birds under semi intensive condition are moderately balance in terms of housing, health care and nutritional needs and promises better productivity than extensive model. However, locally adapted chickens would tend to produce better under intensive management where no production ethics are compromised.

Table3: Management System of Indigenous Chickens of Bekwarra, Nigeria

System of Rearing.	Frequency.	Percentage (%)
Extensive	134	64.40
Semi intensive	62	29.80
Intensive	12	5.80
	n(208)	100.00

Table 4: Some Poultry diseases among Indigenous chickens of Bekwarra, Nigeria

Disease	Occurrence	Percentage (%)
New castle disease	98	47.70
Infectious bursa disease (gumboro)	53	25.50
Chronic respiratory disease	27	13.00
Fowl pox	18	8.70
Coccidiosis	12	5.80
	n(208)	100.00

Table 5. Mean population and Live weight of Indigenous Nigerian chickens

Characters	Mean (x)	Standard error(SE)
Number of chicken.		
Hen	5.1	0.09
Cock	3.4	0.02
Growers	4.1	0.04
Chicks	3.8	0.03
Body weight (Kg)		
Hen	1.5	0.05
Cock	2.0	0.01

(Odah *et al.*, 2018 Phenotypic characterization of Local chickens *Gallus gallus domesticus* of Bekwarra, Nigeria).

Some Poultry diseases among Indigenous chickens of Bekwarra, Nigeria

The percentage of some poultry diseases of local fowl is described in table 4. Disease presence in poultry farms can cause low output irrespective of production and management system adopted. It lowers growth rate, egg production, weight gain and increase mortality and morbidity. The predominant poultry disease in Bekwarra were; New castle 47.70%, Infectious bursa disease (gumboro) 25.50%, Chronic respiratory disease 13.00% and (8.70%) Fowl pox. Similar result was reported by (Hill and Modebe, 1961; Uza *et al.*, 2001 and FAO 2012). High occurrence of new castle disease and gumboro in this report agree with (Atteh, 1990 and FAO, 2012). Chronic respiratory disease, Fowl pox and Coccidiosis in this current study conform with (Kitalyi, 1997 and Mbugua, 1990) for local chickens of Kenya and Botswana respectively. The explanation for this is probably due to uncontrolled contact between different flocks and ingestion of contaminated water and feed materials during scavenging. This is further buttressed by

Tadelle *et al.* (2006) who indicated that the prevalence of poultry disease in rural areas resulted from uncontrolled purchase and exchange of birds as gift between households.

Mean mortality rate of $34.8 \pm 07\%$ observed in this study is lower than 48.78% reported by Omeje and Nwosu (1983) for native chickens of Ekiti, Nigeria. This might have resulted from the fact that indigenous chickens in the forest zones are more disease resistant and well adapted to local environment. High mortality rate in this report might have resulted from wild birds' attack, predators, inadequate nutrition and accident. Majority of mortality cases in native chicken flocks occur between hatching and the end of brooding period. This suggests that poor management system can influence bird mortality. Solomon (2003) also reported slow growth, recurrent disease outbreak and high mortality among local chickens managed under extensive and semi-intensive systems. This could be due to parasitic attack as birds feed on worms and ingest parasite eggs during scavenging. High mortality among local chickens under

Intensive condition is due primarily to the fact that they are not use to confinement.

Population and Live weight of Ingenuous Nigerian Chicken per Household

Table 5 represent the mean population and live weight of indigenous Nigerian chickens. The body size of an individual is determined by its growth ratelbe, (1993). In Nigeria, native chickens possess small body and grows slowly Nwosu *et al.* (1980). Different locally adapted animals in the tropics have different live weights. Their live weights vary with different management systems Eschiette and Okere, (1990) and sex dependent. The mean population of hen, cock, growers and chick owned per house hold were 5.1 ± 0.09 , 3.4 ± 0.02 , 4.1 ± 0.04 and 3.8 ± 0.03 respectively.

Average live weight value of birds in Bekwarra, Nigeria were 1.5 ± 0.05 g hens and 2.0 ± 0.01 g for cocks. This agree with (Sonaiya 2000;Mancha, 2004;Fayeye *et al.*, 2005; Apuno *et al.*, 2010 and Daikwo *et al.*, 2011) who reported an average of (1.0-2.5Kg) for local chickens of Adamawa, Delta, Kogi, Kaduna and Plateau state Nigeria. This report is in line with the findings of Mopate and Lony (1999) for traditional scavenging chickens of Chad Republic. However, Mbap and Zakar (2000) reported a higher value(3.0kg) for commercial birds of Yobe state, Nigeria. Higher body weight is expected because commercial birds tend grow faster than local birds. Generally, low body weight of local chickens in this current study can be attributed to poor management, low genetic potential and parasitic problems. Variation in live weight with sex observed is in harmony with previous report by (Halima, 2007 and Ibe, 1992) for Nigerian and Ethiopian local chickens. Differential growth rate of birds and sexual dimorphism might have accounted for this variations. This indicates that locally adapted birds in Bekwarra, Nigeria are unmixed with exotic lines else their weight would have been higher.

CONCLUSION

Low productivity in local fowls is due to poor management, nutritional deficiency, diseases, parasitic attack and low genetic potential. Uncontrolled contact between different flocks and ingestion of contaminated feed materials during scavenging in extensive and semi intensive production models increases disease prevalence in rural poultry production.

Disease presence lead to reduced egg production, growth rate, body weight, and increase mortality and morbidity irrespective of management system adopted. No housing structure in extensive system expose birds to (harsh environment, disease factors, predators, theft and accident), leading to loss of birds. Chickens kept under semi intensive condition are moderately balance in terms

of housing, health care and nutritional needs hence, promises better productivity. Locally adapted chickens are not use to confinement. Total scavenging birds often come down with vitamin deficiency, and lack required nutrients for growth, maintenance and production. Feeding constitute a vital component of growth and production in chickens.

Therefore, providing shade for scavenging areas, health care, water and supplementary feed under extensive and semi intensive conditions could improve bird comfort and productivity.

REFERENCES

- Aichi SL 1998. Planning for biodiversity. *Science*, 279: 2068-2069.
- Alamaya CU, Adebambo OA, Ozoje MO, Oduguwa OO, Peters SO 2006. Egg production of pure and crossbreed Nigerian local chickens. Proceedings of an international conference on rural poultry in Africa. Ile-Ife Nigeria. 13-16, Sept., 2006. 56-61.
- Atteh JO, Oblongbela 1993. Rural Poultry Production in Western Middle Belt Region of Nigeria. In: Sonaiya, E B (Ed) Rural Poultry in Africa: Proceedings of an International Workshop held in Ile-Ife, Nigeria, November 13 - 16, 1989. Thelia house, Ile-Ife. Pp. 211-217.
- Badubi SS, Rabereng M, Marumo M 2006. Morphological characteristics and food availability for indigenous chickens in Botswana. *Livestock for Rural Development*. 16 (7.)
- Bogale K 2008 in- situ characterization of local chicken for functional traits and production systems for Forgeaye district, Ambara regional state. M.SC thesis submitted to Department of Animal science, school of post graduate studies, Hamaraya University.
- CRSMA 2002 (Cross River State Ministry of Agriculture). Annual Agricultural bulletins. Vol.35 (12). Calabar, Nigeria.
- Daikwo IS, Okpe AA, Ocheje JO (2011). Phenotypic characterization of local chicken in Dekina department of Animal production, Faculty of Agriculture, kogi state university, Anyigba, Nigeria. *Int. j. poult. Sci.* 10(6). 444-447, 2011 ISSN 1682-8356
- Dunya AM, Mamza, AO, Yusuf SZ (2015). Local Chicken Management in Rural Borno State, Nigeria. *J. Bio.Agric. Healthcare*. www.iiste.org ISSN 2224-3208 (Paper) ISSN 2225-093X (Online) Vol.5, No.4, 2015 113.
- FAO (2012). phenotypic characterization; of animal genetics resources, FAO Animal production and Health Guidelines No ii Rome, Italy
- FAO (2000). (Food and Agricultural Organization). Poultry production in warm-wet climate. Spectrum Books Ltd, Ibadan, Nigeria. Food and Agricultural Organization (FAO) 2000.

- Fayeye TR, Adeshiyani AB, Olugbami AA (2005). Egg traits hatchability and early growth performance of the Fulani- ecotype chicken livestock Research for rural development 17(8):1-7
- Gueye EF (1998). Village egg and fowl meat production in Africa. *World Poultry. Sci. J.*, 54: 73-86.
- Gueye EF (2002) Family poultry research and development in low income food deficit countries; Approaches and prospects. Outlook on agriculture volume 31. Number 1.75
- Halima H. (2007). Phenotypic and genetic characteristics of indigenous chicken population in north West Ethiopia Ph.D. thesis; university of the Free State. Bloemfontein, South Africa.
- Hill DH, Modebe ANA (1961). Poultry production at the university college Ibadan (1950-1958), university of Ibadan, Faculty of Agriculture Technical Bulletin No2.
- Ibe SN (1992). Incorporating adaptability genes in poultry breeding programs in Nigeria. Proceedings of the 19th World Poultry Congress, September 20-24,
- Ibe SN (1993). Growth performance of normal, frizzle and naked neck chicken in a tropical environment. *Nig. J. Anim. Prod.*, 20: 25-31.
- Kitalyi AJ (1997). Village chicken production in developing countries; what does the future hold: world Animal Review. 82 (2): 48-53.
- Kperegbe TA, Adebambo OA, Ozoje MO (2009). Early growth performance of crossbred from different sire strains. Proceedings of the 29th Annual
- Mancha YP (2004). Characterization of local chickens in northern part of the Jos plateau, A Ph.D. Thesis Animal production program, School of Agriculture, ATBU, Bauchi 7-86.
- Mapiye C, Sibanda S 2005 Constrains and opportunities of village chicken production systems in the small holder sector of Rushinga district of Zimbabwe. *Livestock Research for rural development* 16 (7).
- Mbap ST, Zakar H (2000) Characterization of local chickens in Yobe state, Nigeria. In; the role of Agriculture in poverty alleviation. Abubakar, M.M, Adegdola, T.A and Butswat, I.S.R. (Ed). Proceedings of the 34th Annual Conference of Agricultural Society of Nigeria. 15-19 Oct, Bauchi pp126-131.
- Mbugua PN (1990). Rural small holder poultry production in Kenya. In: proceeding of international CTA seminar on rural small holder production, Thessaloniki, Greece.
- McAinsh CV, Kusina J, Madsen J, Nyoni O (2004). Traditional Chicken production in Zimbabwe. *World Poultry. Sci. J.* 60; 233-246.
- Momoh OM Nwosu CC (2008). Genetic evaluation of growth traits in crosses between two ecotypes of Nigeria Local Chicken. *Livest. Res. Rural Dev.*, Vol.20, No. 10.
- Mopate E, Lony J (1999). Characteristics of rural chicken production in Apac and Kumi districts of Uganda. Paper presented at the NARO scientific conference 5-10 Dec. 2001. Kampala, Uganda.
- NPC 2001. National Population Commission.
- Nwagu BI (2002). Incidence and influence of Naked neck and frizzle genes on body size of local chickens M.Sc. thesis, University of Ilorin, Nigeria.
- Nwosu CC, Obioha FC, Fred G Belonwu TC, Onuora GI, Omeje SSI (1980). A study of the growth pattern of local and exotic chickens. *Nig. J. Animal Sc.*
- Oluyemi JA, Longe GA, Songu T (1982). Requirement of the Nigeria indigenous fowl for protein and amino acid. *Ife. Journal. Agric* 4:105-110.
- Oluyemi JA, Roberts EA (2000). Poultry production in warm wet climates. Revised Edition. Macmillan Publishers Ltd, London 1-15
- Omeje SSI, Nwosu CC (1983). Productivity of indigenous chicken in owerri L.G. A B. agric Tech. Project. Dept. Anim. Prod. Fed. UN. Tech. Owerri.
- Otechere EO, Adeoye AT, Gefu JO, AA (1990). Preliminary observation on village poultry production in north central Nigeria. In: rural poultry production in Africa.
- RIM (Resources Inventory and Management Ltd), 1992. Nigeria National Livestock Survey.
- Santos MJB, Pandorfi H, Rabello CBV, Silva EP, Torres TR, Santos PA, Morrill WB, Duarte NM (2014) Performance of Free-range Chickens reared in Production modules enriched with Shade net and perches. *Rev. Bras. Cienc. Avic.* vol.16 no.1 Campinas Jan./Mar. 2014. <http://dx.doi.org/10.1590/S1516-635X2014000100003>.
- Sonaiya EB, Odubote IK, Badmans R, Omeje F, Wimmers K, Valle Zarate A, Horst P (1998). Evaluation of Nigerian Local poultry ecotypes. INFPD. Newsletter vol. 8 No2 Feb- march 1998, 6-9.
- Sonaiya EB (2000). ANRPD progress reports Nov. 1989-June 1995. In: sustainable rural poultry production in Africa. Ed. Proceeding of an international workshop. Addis- Ababa, Ethiopia ANRPD 134-143.
- SPSS (2006). Statistical Packages for Social Sciences. Version 16.0.
- Tadelle DT (2003). Production of local chickens under village management system. *Tropical Animal Health and Production*, 34(5) 405-416.
- Tadelle DT, Ogle B, Million T, Alemu Y, Peters KJ (2006). Studies on Village chicken production systems. International Workshop Held in Ile-Ife, Nigeria, Nov. 13-16, Thelia house, Ile-Ife, pp.: 243-247. *Rural Dev.*, 13: 1-6. Ogun State, pp.: 1-8. *Poultry. Avian Biol. Rev.*, 7: 1-29. *Prod.*, 7: 38-38. *Nigeria. Nig. J. Genet.*, 9: 33-39.
- Tadelle DT, Million Y, Alemu Peters KJ (2002). Studies on Village Poultry Production Systems in the Central High Lands of Ethiopia. International Poultry Summit, Sweden Feb. 22-26, SI, Ola. pp.: 84-91.
- Uza DV, Olurunju SAS, Orkpeh JMT (2001). An assessment of the disease production status of indigenous poultry in Benue and Nassarawa states of Nigeria. In: strategies for poverty Alleviation: Animal production option.

