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UPGRADING LOCAL CHICKEN WITH SHIKABROWN® COCKS: AN ASSESSMENT OF THE EFFECTS ON POULTRY FARMERS' LIVELIHOOD IN GIWA LOCAL GOVERNMENT AREA, KADUNA STATE, NIGERIA

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ABSTRACT

The study was conducted to assess the effects of the adoption of ShikaBrown® cocks on the indigenous poultry farmers' income, egg production and weight gain of the chickens produced in Giwa and Sabon Gari Local Government Areas of Kaduna State, Nigeria. The location of the study covered ten (10) villages (Hayin Gada, Maraban Guga, Mahuta, Kurku, Tsibiri, Salenke, Ungwa Galadima and Bijimi in Giwa LGA, while Karfe and Biye in Sabon Gari LGA). A total of two hundred and one (201) poultry farmers were randomly sampled using a multi-stage sampling procedure. Data were collected and analyzed using inferential statistics such as the Z-test. The result showed that 61% of the farmers' income ranged from ₦12,000 to ₦24,000 from poultry production before the adoption of cocks, while the farmers' income ranged from ₦168,000 to ₦362,000 from poultry production after the adoption of SB cocks. The farmers collected more crates of eggs (5-6 crates) after the adoption of SB cocks together with the recommended practice than before the adoption (1-2 crates). The result revealed that the weight of the resultant offspring increased significantly. The Z-value was 21.64, which implied that for every unit of use of the technology, there will be a 21.64% increase in the chicken's weight gain. In conclusion, the overall output of the SB crossed breed was superior to native or local chickens. This calls for rural chicken producers to increase their production by shifting from subsistence to commercial poultry production to guarantee improvement in the livelihoods of the rural farmers. Since poultry is a major asset and key to improving livelihood, this study recommends that farmers should be encouraged to intensify the adoption of SB cocks and also the recommended practices for upgrading indigenous/local chickens.

Keywords: Assessment, ShikaBrown® cocks, effects, adoption, farmers, Kaduna State

INTRODUCTION

Poultry production plays an important role in rural incomes in Sub-Saharan Africa. Smallholder chicken production is integral to rural and resource-poor households' livelihoods in sub-Saharan Africa. It accounts for about 80% of the region's poultry flock (Mengesha, 2011; Birhanu *et al.,* 2022). In Nigeria, poultry, mostly chickens, play a major role in rural areas and also contribute substantially to the Gross Domestic Product (GDP). Nigeria is recorded as having the second-largest chicken population in Africa, with a standing stock of about 249 million heads producing more than 14 billion eggs and 454,000 tons of meat annually (Masaki *et al.,* 2020; Saifaddin, 2024). The livestock sub-sector is an important component of agriculture with much potential, as it can contribute to economic diversification, food security and nutrition, improved rural livelihood and sustainable income generation (Harrison *et al.,* 2024). Additionally, the industry provides chains of employment (MoFA, 2018; Opoku, 2024) not only to those engaged in its production directly but also for the

hatchery operations, feed dealers, manufacturers of incubators, building materials, processors of egg and poultry products and all dealers engaged in the marketing of egg and poultry products. With growing demand, the poultry value chain presents opportunities, especially for the local chicken farmers (Ayo, 2018).

Local chickens are distinct in their genotype, which influences biological parameters such as the robust adaptability to the backyard environment, as it predisposes the birds to unique traits (such as strong predator avoidance, disease resistance, hardy and other survival instincts). These traits make the free-range, semi-scavenging feeding possible (Kamau *et al.*, 2019). The homestead provides additional resource inputs such as water, feeding scraps and rudimentary shelter. Local chicken production contributes significantly to rural and peri-urban households' socio-economic development and nutritional requirements. The bird's products (meat and eggs) are preferred for their good quality, texture, taste and health characteristics and are valuable assets to farmers (Baézaa *et al.*, 2021).

Poor households often consider chickens the last asset in the event of economic shocks, to produce meat and eggs for their immediate families. However, the rate of egg production is low, the body weight is usually light, and the meat is small compared with imported broilers or layers (Grobbelaar, Suthenand, and Molalakgota, 2010; Ifemma and Ogochukwu, 2023). Crossbreeding indigenous chickens with exotic breeds improves growth traits, live weights, daily gains, feed intake, and the egg size of the crossbred progeny due to the positive genetic correlation between body size, survival rate, and age at sexual maturity (Grobbelaar, Suthenand and Molalakgota, 2010; Kebede, Abgaz and Fekansa, 2019).

Selected breeds like the ShikaBrown® chickens, which are adapted to diseases and adverse environments, and some disease conditions produce higher body weight, number of eggs and more meat than the indigenous chicken types. The genetic diversity of the indigenous and exotic chicken breeds can be utilized by cross-breeding (Olutunmogun *et al.*, 2024). The main purpose of crossing-breeding in chickens is to produce superior crosses (hybrid vigour): to improve fitness, fertility traits, and to combine different characteristics for which the crosses are valued since crossbreeding exploits genetic variation (Amao, 2017). Evidence from studies conducted in Nigeria revealed that body weight and egg production at the smallholder level can be increased by upgrading or crossbreeding in a semi-scavenging poultry model (Egahi *et al.*, 2010). Based on these anticipated performances of local (Indigenous) chickens when crossbred with SB cocks, the West African Agricultural Productivity Program (WAAPP), in collaboration with the Livestock Research Programme, National Animal Production Research Institute (NAPRI), developed a programme in 2015 tagged “Cock Exchange Program". It was geared towards upgrading the local chickens, which is envisaged to transform and enhance the livelihood of farmers.

The upgrading program involves the withdrawal of local cocks from the farmers and replacing them with the exact number of ShikaBrown® cocks, provision of poultry feeds to the chickens in addition to scavenged feeds like insects and fresh greens and provision of clean water at all times (adopting the semi-intensive system of production). The upgrading was developed to serve a dual purpose: the ability to produce more eggs and meat compared with the typical local chicken, to mature faster and reach market size in a short time (NAPRI, 2015).

STATEMENT OF RESEARCH PROBLEM

There is a wide gap in insufficient protein consumption in Nigeria; dietary protein consumption in Nigeria is low. The average annual protein consumption in Nigeria is put at 45g/capita per day compared to the global

average of 64g, which is a far cry from FAO's recommended level of 53.8g/capita per day (FAO, 2021; Obayelu, 2022). The continued rise in the cost of production of cattle, sheep and goats for meat and local production of livestock-derived products (e.g. milk, meat and egg) is lagging compared to the skyrocketing demands in Sub-Saharan African countries, due to the low performance of the local chickens in terms of quantity to satisfy the growing human population in rural, peri-urban and urban households (World Poultry, 2013; Erdaw, 2023).

ShikaBrown (SB) sire line cocks, are an indigenous improved breed of chicken developed in NAPRI (NAPRI, 2012; Olutunmogun *et al.*, 2024). They were exchanged, and the resultant offspring from the SB sire line cocks breed is expected to be physically and genetically different from the typical local chickens (Amao, 2017). The qualities of SB sire line cocks' adaptation to environmental disease conditions, production of higher body weight, increased number of eggs and more meat than the local chicken made the WAAPP to carry out the cross-breeding/upgrading program by replacing local cocks with SB sire line cocks of rural poultry farmers in Giwa and Sabon Gari Local Government Areas (LGAs) of Kaduna State. The adoption of SB sire line cocks has the potential to transform the livelihoods of the targeted farmers. Thus, there is a need to assess the effects of up-grading the local chickens with SB cocks on the livelihood of farmers in Giwa and Sabon Gari LGAs of Kaduna State. Furthermore, literature on the effects of adopting SB cocks on farmers' livelihood is scanty. Hence, the objectives of this study are to: (i) assess the effects of the adoption of SB cocks on the indigenous poultry farmers' income; (ii) on the quantities of eggs produced; and (iii) weight gain of the chickens.

MATERIALS AND METHODS

Study Area

Giwa Local Government Area (LGA) is one of the twenty-three LGAs of Kaduna State. Giwa has an area of 2,066km^2 and a population of 212,671 in 2006, while the projected figure in 2023 was 825,493 at a growth rate of 3.2%. While Sabon Gari LGA had a population of 633,096 in 2006, the projected figure in 2023 was 1,207,534.143 at a growth rate of 3.2% (National Population Census, 2006). The inhabitants of Giwa and Sabon Gari LGAs are predominantly Muslims and Hausa-Fulani by tribe, and other ethnic groups such as Jaba, Kataf, Nupe, Ibo and Yoruba are found in the areas too. Crop farming, livestock rearing and trading are their major occupations. Livestock kept by the inhabitants include cattle, poultry (chickens), goats, and sheep.

Study Design - A two-stage sampling procedure was employed for this study. The first stage is the purposive selection of 10 villages where the ShikaBrown® cocks were exchanged with the local chickens. These areas are: Hayin Gada, Maraban Guga, Mahuta, Kurku, Tsibiri, Salenke, Ungwar Galadima, Bijimi in Giwa L.G.A., and Karfe and Biye in Sabon Gari L.G.A. Yamane's (1973) formula, adopted by Yusuf *et al.* (2024), was used to calculate the sample size for the study with a 95% confidence level and assumption of a 5% expected margin of error. In the second stage, 49% of the poultry farmers in each village were randomly selected from the sample frame of each village to make a total of two hundred and one (201) poultry farmers.

Method of Data Collection and Tool of Analysis

Data were collected with the aid of a structured questionnaire. The data collected were based on before and after the adoption of SB cocks. Z-test was used to analyze the data for the stated objectives (effects on income, eggs and weight gain).

Test for Income, Eggs and Weight gain:

$$Z = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{S_1}{n_1} + \frac{S_2}{n_2}}}$$

Where; Z = calculated z value;

$\overline{X}_1$ = mean value of farmers' income, eggs and weight gain before the adoption of SB cocks;

$\overline{X}_2$ = mean value of farmers' income, eggs and weight gain after the adoption of SB cocks;

S_1 = standard deviation of farmers' income, eggs and weight gain before the adoption of SB cocks;

S_2 = standard deviation of farmers' income, eggs and weight gain after the adoption of SB cocks;

n_1 = sample size of farmers before the adoption of SB cocks

n_2 = sample size of farmers after the adoption of SB cocks

RESULTS AND DISCUSSION

The result presented in Table 2 revealed a greater proportion (61%) of the farmers' income ranged from ₦12,000 to ₦24,000 from poultry production before the SB cock exchange programme. While 19% of the farmers' income ranged from ₦272,000 to ₦284,000 from poultry production after the SB cock exchange programme. Hence, it was found that the income of the farmers increased significantly. The Z-value was 20.64, which implied that for every unit of use of the technology package would be a 20.64% increase in the farmers' income. The value obtained indicates that poultry egg production is a profitable business. These results are consistent with the findings of Salami *et al.* (2021) where, majority of the farmers in their study made a weekly income of ₦20,000 – ₦40,000 through poultry farming. Similarly, Akintunde *et al.* **(**2021) found that there were high gross margins (₦1,867,428.00) and net profit (₦1,576,645.00) for poultry farmers. The gross return per naira invested, as revealed in their study, showed that, for every naira (₦) invested, ₦1.05 is earned. According to Alabi *et al.* (2020), before the African Chicken Genetic Gains (ACGG) interventions, the average monthly income of participating farmers in Ondo was N15,100. Sales from eggs and chicken represented about 20% (₦3,020) of that total income. However, within the project period, the overall average household monthly income from eggs and chicken sales increased by 231% from ₦3,020 to ₦7,750. The increase in household income was a result of the weight and high number of eggs laid by the improved breeds compared with the local chickens.

Income before SB Adoption	Freq	%	Income After SB Cocks Adoption	Freq	%	Z-value
12,000 - 24,000	123	61	-	-	-	
25,000 - 37,000	70	35	-	-	-	
38,000 - 50,000	8	4	-	-	-	
-	-	-	168,000 - 180,000	14	7	
-	-	-	181,000 - 193,000	12	6	
-	-	-	194,000 - 206,000	14	7	
-	-	-	207,000 - 219,000	19	9	
-	-	-	220,000 - 232,000	12	6	
-	-	-	233,000 - 245,000	11	5	
-	-	-	246,000 - 258,000	17	9	
-	-	-	259,000 - 271,000	9	5	
-	-	-	272,000 - 284,000	39	19	
-	-	-	285,000 - 297,000	17	9	
-	-	-	298,000 - 310,000	8	4	
-	-	-	311,000 - 323,000	9	5	
-	-	-	324,000 - 336,000	6	3	
-	-	-	337,000 - 349,000	7	3	
-	-	-	350,000 - 362,000	4	2	
-	-	-	363,000 and above	3	1	
Total	**201**	**100**		**201**	**100**	
Minimum	**12,000**			**168,000**		
Maximum	**57,250**			**371,750**		
Mean	**34,625**			**269,875**		
						20.640***

Table 1: Effects of Adoption of ShikaBrown® Cocks on the Farmers' Income

Effects of Adopting ShikaBrown® Cocks on the Crates of Eggs Collected

The result in Table 3 showed the number of eggs (crates) collected by the farmers before and after the cock exchange programme. The Z-value was 34.46, which implied that, for every unit use of the recommended practice will result in a 34.46% increase in the number of crates of eggs collected. The farmers collected more crates of eggs (5-6 crates) after the adoption of SB cocks together with the recommended practice than before the adoption (1-2 crates). The farmers, therefore, gain more money from the sales of these eggs to purchase other items needed in the family and thereby, increasing their living standards. This result on the average quantity of eggs collected is similar to that of Olatunmogun *et al.* (2024), where the authors reported that ShikaBrown® sire line (SB) crossed with local chickens led to the improvement of egg number per clutch. Allso, Alabi *et al.* (2020) reported that Shika Brown hens laid more eggs and egg weight was also higher than the values reported for local chicken.

Table 3: Effects of the adoption of ShikaBrown® cocks on the crates of eggs collected

	Before adoption		After adoption		Z-value
Crates of eggs collected	**Frequency**	**Percentage**	**Frequency**	**Percentage**	
1-2	133	66.2	0	0.0	34.469***
3-4	68	33.8	0	0.0	
5-6	0	0.0	103	51.2	
7-8	0	0.0	70	34.8	
9-10	0	0.0	18	9.0	
11 and above	0	0.0	10	5.0	
Total	**201**	**100**	**201**	**100**	
Minimum	**1**		**5**		
Maximum	**9**		**14**		
Mean	**5**		**9.5**		

**** represents significance at a 1% level of significance*

Effects of adopting ShikaBrown® cocks on the chicken weight gain

The Z-test result presented in Table 4 revealed that the weight of the resultant offspring increased significantly. The Z-value was 21.64, which implied that for every unit of use of the technology, there would be a 21.64% increase in the chicken's weight gain. This finding supports that of Kwena *et al.* (2025), Mozdziak (2019), and Abdulrahman *et al.* (2022), who reported that crossbreeding indigenous chickens with improved breeds enhances live weights, feed intake, and produces meat for human consumption. Furthermore, the finding from this study conforms with the report of Olatunmogun *et al.* (2024), who also found improvement in the average body weight of the resultant offspring. The increase in the weight of chickens translates to more money for the farmers since the heavier the chickens, the more costly they become.

Table 4: Effects of adopting ShikaBrown® cocks on the chicken weight gain

Weight (kg)	**Before adoption**		**After adopting SB cocks**		**Z-value**
	Freq	**Percentage**	**Freq**	**Percentage**	
0.9-1.3	113	56.2	0	0.0	21.644***
1.4-1.8	64	31.8	44	21.9	
1.9-2.3	24	11.9	94	46.8	
2.4 and above	0	0.0	63	31.3	
Total	**201**	**100**	**201**	**100**	
Minimum	**0.9**		**1.4**		
Maximum	**2.9**		**3.3**		

**** represents significance at a 1% level of significance*

CONCLUSION AND RECOMMENDATIONS

In conclusion, the results of this study on income, quantity of eggs collected and weight gain of the chickens agree with previous reports on the economic significance and contribution of SB cocks on the livelihood of farmers. Thus, the overall output of the SB-crossed breed was superior to the native or local chicken. This calls for rural chicken producers to increase their production by shifting from subsistence to commercial poultry production to guarantee improvement in the livelihoods of the rural farmers. Since poultry is a major asset and key to improving livelihood, this study recommends that farmers should be encouraged to intensify the adoption of SB cocks and also the recommended practices for upgrading indigenous/local chickens. Furthermore, the cock exchange programme should be extended to other parts of Kaduna State.

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