

Regulatory Approach to Poultry Production in Nigeria: Chicken Breeds Trading and Development of Database in Nigeria

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Abstract

The study investigated the characterization and documentation status of available chicken breeds in Nigeria, likewise, the development of a chicken diversity database for inventory and future uses in Nigeria. Eleven major and some subsidiary chicken promoters/companies were surveyed. Data were obtained through individual interviews with some members of the day-old-chick (DOC) Merchants Association of Nigeria. A total of 400 respondents were randomly selected and interviewed on the chickens' companies' products and trading routes among customers. The data collected were subjected to descriptive statistical analysis of simple percentages and proportions. For the chicken database development, a free and open-source software XAMPP in Bitnami and content management framework (CMF) written in PHP and MySQL database were explored. None of the chicken promoters/companies in the country responded positively to the survey. Intra-West African countries trading was facilitated. The developed stand-alone chicken database named chickendb_ng runs on open-source software known as XAMPP (Cross-platform Apache MariaDB PHP and Perl) stack on the MariaDB Server 127.0.0.1 via TCP/IP with Server version of 10.4.1.8-MariaDB. The User, root @localhost with Protocol version of 10 and Server charset cp 1252 West European (Latin 1). The chicken database featured 23 tables in a friendly Graphical Users' Interphase to collect the data of interest on Nigerian chicken breeds/strains. Implementation of the developed stand-alone chickendb_ng will aid documentation of Nigerian chicken breeds, possible integration with other international databases, and may increase agricultural and food productivity in Nigeria. The chickens' database system may also lead to their outputs' growth and thereby strengthen intra-Africa trade.

Keywords

Chicken genetic resources, chicken companies/promoters, chicken products trading, inventory, poultry regulations

1. Introduction

Nigeria is a part of the Economic Community of West African States, ECOWAS [1], and the largest economy in Africa. The government recognizes agriculture as an important sector of the economy after oil [2] which accounts for 35.2 % of

gross domestic product, GDP [3] with high potentials for employment generation, food security, and poverty reduction. Anyway, the livestock sector has always been an important component of the Nigerian economy. The Nigerian poultry industry is about 180 million birds producing up to 454 metric tonnes of meat and 14 billion eggs per year in an intensive system with 17,000 commercial holdings [4; 5; 6] raising 40 million birds. About 80 million chickens are raised in extensive systems and 60 million under semi-intensive systems. Nigeria has the second largest chicken population in Africa after South Africa [4]; the poultry industry is rapidly expanding and has emerged as the most commercialized sub-sectors of Nigerian agriculture [3]. Sadly, the export of outputs plays a minor role in this particular agri-business sub-sector [3].

The industry presents a unique opportunity for trade and investments in certain aspects of a value chain. Markets also play different roles in livestock trade depending on the overall structure of the regional network [7]. Despite the importance of the sub-sector, growth in livestock output has been slow. The agricultural share in Nigeria's total earnings remains small compared to crude oil exports [8]; the trade deficit has widened with imports exceeding exports, for instance, N689.7 billion in 2019 compared to N549.3 billion in 2018 [8]. Other issues facing the industry range from non-registration of existing and new poultry breeds/strains to non-compliance of chicken promoters/companies with government agencies on the regulations guiding the commercialization of livestock breeds in Nigeria. Lack of a database of animal diversity for documentation of livestock breeds/strains to non-availability of poultry breeders' association among others, are the problems facing poultry production in Nigeria [9].

Globally, four strategies are recommended for the management of animal genetic resources (AnGRs) which include conservation; characterization, inventory, and monitoring of trends and associated risks; sustainable use and development; and Policies, Institutions, and capacity building [10]. Also, there is a national regulation governing the commercial utilization of livestock breeds [11] which stipulates registration of both the existing and newly-developed livestock breeds [12, 13]. Still, there has been an extant violation of the regulation majorly by the livestock producers. [14] and [6] highlighted the step in the management of animal genetic resources for food and agriculture which includes the inventory of species and breeds, population sizes, geographic distribution, and genetic diversity is generally undertaken as a first step in any National programme.

Animal (chicken) registration and database system can be such a powerful tool for boosting agricultural productivity, improving animal health, and ensuring food safety. [15] corroborated the fact that the full potential of any livestock or animal breeds can only be actualized if the information gathered through several conservation and characterization studies are documented to a database. However, Nigeria is deficient in animal diversity database [16] until the development of chickendb-ng [6]. Assigning national codes to the existing and newly-developed livestock breeds is necessary for country inventory, monitoring of animal genetic resources population, and possible integration with other international databases and information systems for increased agricultural and food productivity in Nigeria. The study investigated the utilization, registration, and documentation status of chicken genetic resources in Nigeria and the development of a chicken diversity database for inventory and future uses in Nigeria.

2. Materials and Methods

Eleven major and some subsidiary chicken promoters/companies as outlined by [6] and as seen in Figure 1 were surveyed on the characterization and documentation status of available chicken breeds in Nigeria.

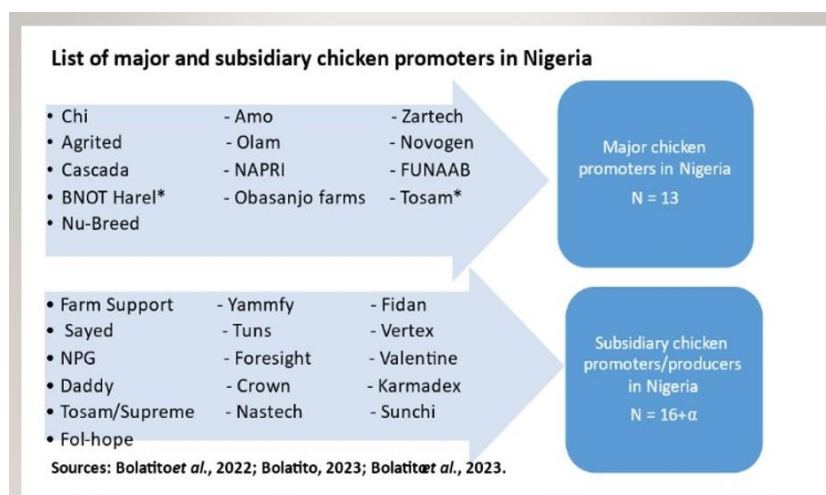


Figure 1. Surveyed list of the major and subsidiary chicken promoting companies in Nigeria.

Physical exploration and courier service were explored in the administration of questionnaires among the chickens' companies. Google form was also deployed to extract information on their stocks' pedigrees and possibly the newly-developed strains as shown in Figures 2-4. Similarly, data were obtained through individual interviews from some members of the day-old-chick (DOC) Merchants Association of Nigeria on their merchandise. A total of 400 respondents were randomly selected and interviewed on the DOC trading routes of their customers. The data collected were subjected to descriptive statistical analysis of simple percentages and proportions.

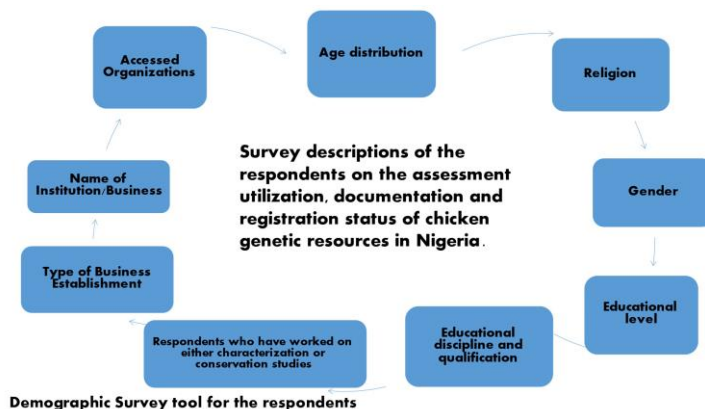


Figure 2. Demographic survey descriptions of the chicken promoters/producers in Nigeria.

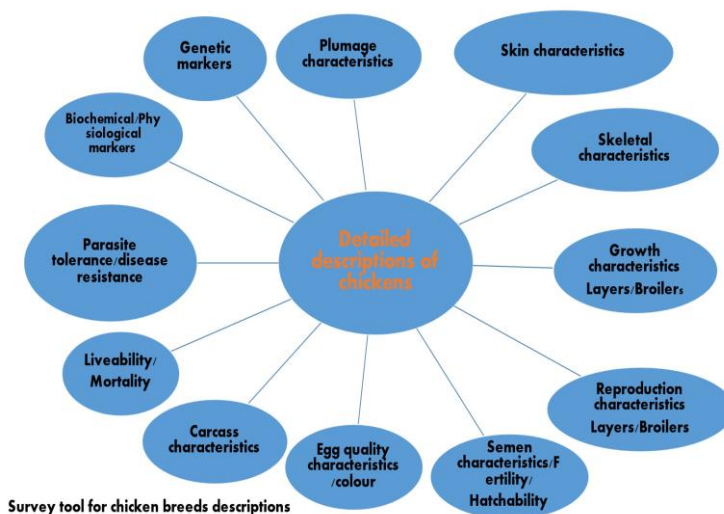


Figure 3. Survey tool for detailed descriptions of Nigerian chicken breeds.

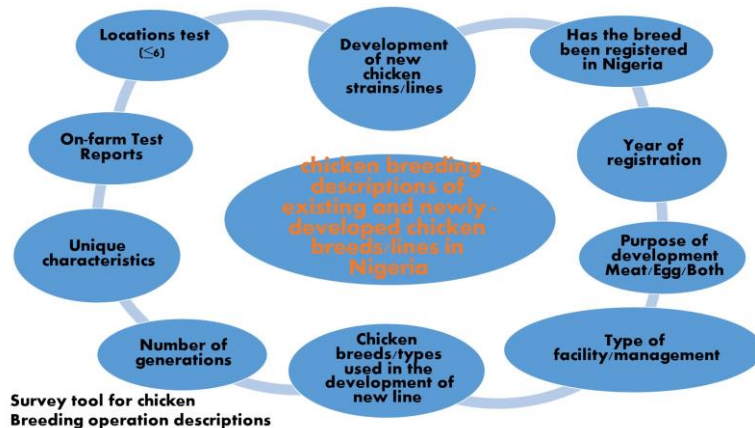
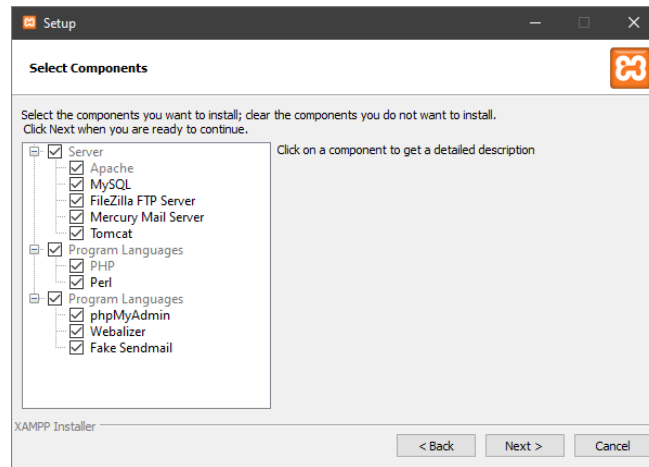


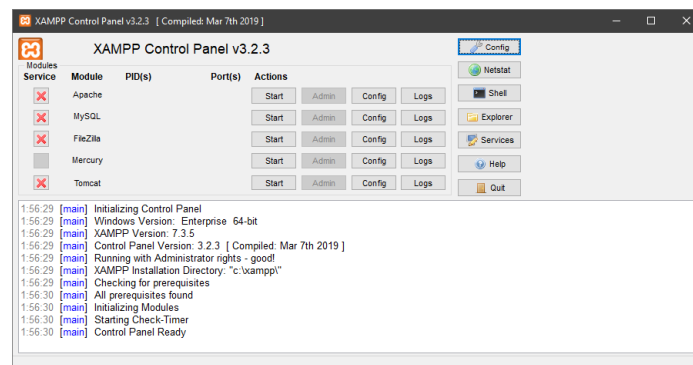
Figure 4. Survey tool for chicken breeding operation descriptions.

3. Chicken database development

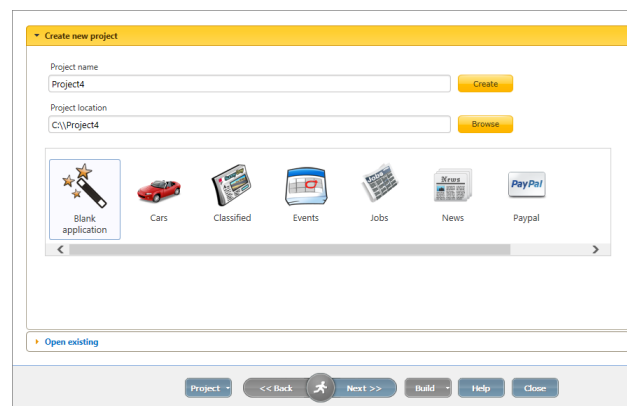
For the chicken database development, a free and open-source software XAMPP (Cross-platform Apache MariaDB PHP and Perl) in Bitnami [17, 18] and a content management framework (CMF) written in PHP and MySQL database were explored. The open-source MySQL available under the General Public License (GPL) was utilized to create the back end of the database. Similarly, the web framework or the front end of the database was built using the web programming language, PHP [18]. In addition, the system was developed on a Windows machine running on a PC (personal computer) Windows 10 and deployed on a local Apache server (Figures 5-6). PHPRunner was utilized in linking the tables on PHPAdmin together (Figures 7-8). Test running of the developed chicken database was done by inputting the information of two locally adapted chicken breeds, Shika Brown® [19] and FUNAAB Alpha® dual-purpose [20] chickens to the database via breed, Browse and Insert on PhpMyAdmin through the backend and front end of the database.



Figures 5. Installation of local web server, XAMPP.



Figures 6. The XAMPP Control Panel.



Figures 7. Linking of multiple tables on PHPAdmin.

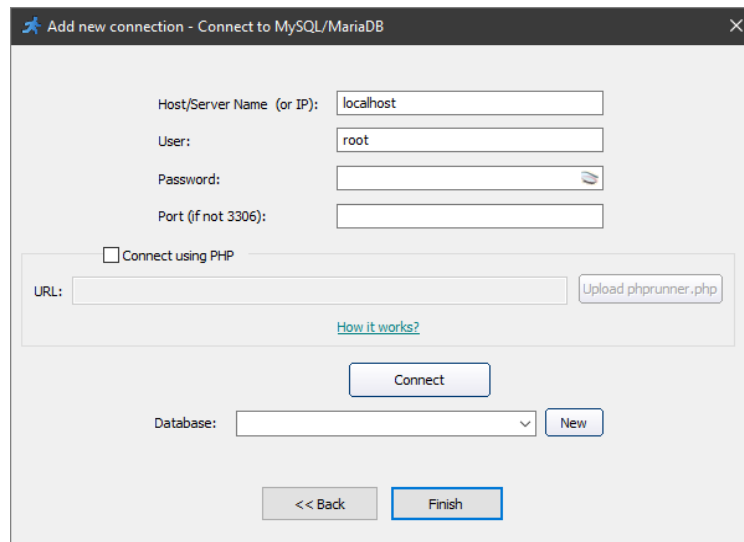


Figure 8. Connecting to MySQL on PHPRunner.

4. Results and Discussion

4.1 Relevance of chicken promoters/producers and breed registry to increased food productivity in Nigeria

The chicken promoters/producers who majorly operate the Private farms and Hatcheries in the country were unenthusiastic about the survey exercise. The majority claimed ignorance of the regulations and requirements guiding the commercial utilization of chicken breeds in Nigeria. None of the eleven (11) major chicken promoters/companies and over 28 subsidiary chicken promoters as shown in Table 1 and Figure 11 positively responded to the survey on the documentation and registration status of their stocks (Table 1 and Figure 12). [21] expatiate on the associated problems of social research in Nigeria. Nevertheless, commercial chicken breeds in the open market without evidence of any registration are punishable under the Act of Parliament [11] as described by [22]. A total of 19 chicken breeds were registered as native chickens at the Indian Chicken Breed Registry (ICAR-NBAGR) National Bureau of Animal Genetic Resources [23-25]. Unpretentious compliance by the chickens' companies with the existing law by providing valuable insights on their chicken stocks could contribute significantly to a more sustainable and efficient food system in Nigeria.

4.2 West African countries community trading of Nigerian day-old-chicks

The respondents' highest educational qualifications are Higher National Diploma and First Degree, representing 36.36 % male and 38.33 % female, respectively. The patronage of some of the DOC at the Southwestern Nigeria by customers is not restricted to Nigeria alone (Figure 9) but stretches to other West African Countries. Togo is seen to be highly patronizing the Nigerian market for their day-old chicks' stocks (Figure 10).

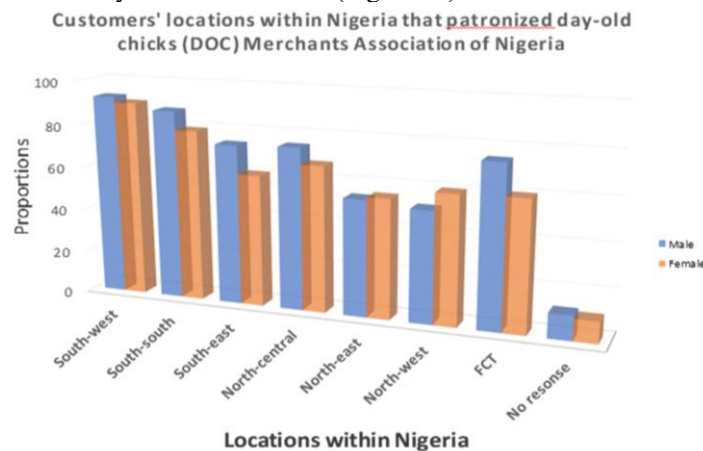


Figure 9. Customers' locations within the country that patronized some DOC Merchants Association of Nigeria.

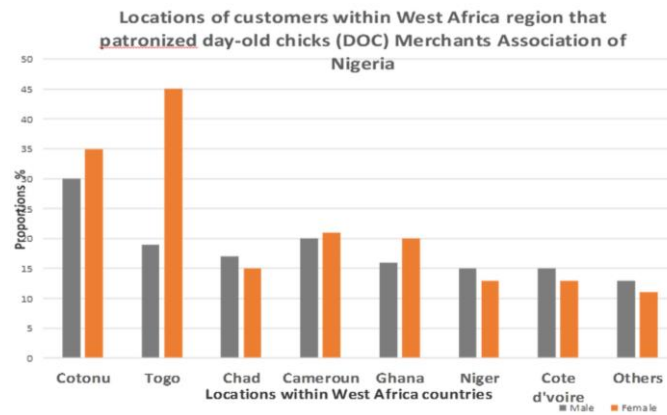


Figure 10. Customers’ locations within West Africa that patronized some DOC Merchants Association of Nigeria.

The West African countries' community trading could be associated with market accessibility which is proxied by road. [4] corroborated, saying accessible markets facilitate animal trading with higher frequency and it is a major factor in the regional livestock trade. However, weak inter-regional integrations and poor output growth have dampened the prospect of intra-Africa trade relative to peers such as Europe and Asia [8]. Animal identification and traceability mechanisms cannot be promoted in this scenario, because the said chicken stocks (Table 1 and Figure 12) were not documented to a centralized database system prior to exporting to other countries. The country is however inefficiently managing the livestock industry by not mandating the livestock companies (Table 1 and Figure 11) to maintain breed registry. For poultry production to be more profitable and contribute to export trading, there is a need to improve on the technical (database implementation) and allocative efficiencies for the subsector.

Updated list of major and subsidiary chicken promoters in Nigeria

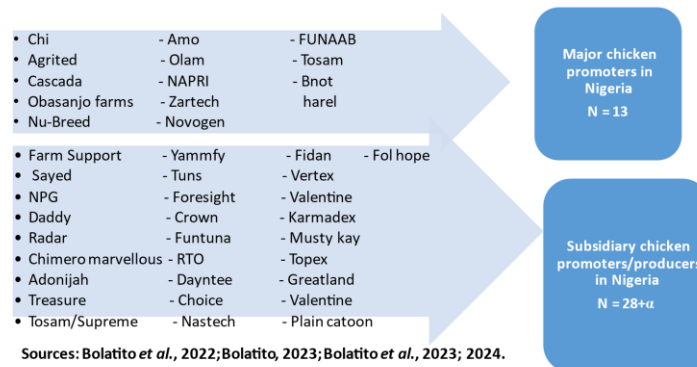


Figure 11. Updated list of major and subsidiary chicken promoters in Nigeria.

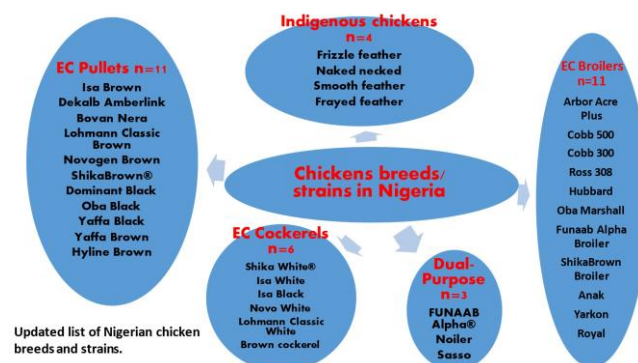


Figure 12. Different types of commercial and indigenous chicken breeds of Nigeria.

Table 1. Updated commercial chicken breeds, types and their promoting companies in Nigeria

Chicken types/breeds	Major chickens' promoters (n=13)	Subsidiary chickens' Promoters (n = 28+a)
Pullets (n = 11) ISA Brown	Chi	
Dekalb Amberlink Bovans Black Lohmann Classic Brown Novogen Brown Shika Brown® Oba Black Black Dominant Yaffa Black Yaffa Brown Hyline Brown	Chi Chi Olam Novogen NAPRI Obasanjo Farm Nu Breed - - -	Amo, Zartech, Farm Support, Yammfy, Fidan, OFN, Crown, Tuns, Fol Hope - - - - - - - - -
Broilers (n = 11) Arbor Acre Plus	Chi	Amo, Zartech, Farm Support, Sayed, Bachelor, Yammfy, Tuns, Fidan, Crown, Vertex, Sunchi, Valentine, Fol Hope
Cobb 500 Cobb 300 Ross 308 Hubbard Royal Oba Marshall FUNAAB Alpha Broiler Yarkon Shika Brown Broiler Anak	Zartech Olam Agrited Bnot Harel Cascada Obasanjo Farm FUNAAB - NAPRI -	- Sayed, NPG Fidan - - - - - - -
Dual-purpose (n = 3) Noiler FUNAAB Alpha® Sasso	Amo FUNAAB Tosam	Amo, Zartech, Farm Support, Yammfy, Fidan, OFN, Crown, Tuns
Cockerels (n = 6) Isa White Isa Black	Chi “ Novogen	- - -
Novo White Lohmann White Brown cockerel Shika White®	Olam Chi NAPRI	-

4.3 Database development for Nigerian chicken genetic resources, chickendb_ng for increased agricultural and food productivity

The chicken database project named chickendb_ng (Figures 13-15) is a stand-alone application designed to facilitate the compilation, organization, and dissemination of information on the origin/pedigree, distribution, diversity, characterization, present utilization, and status of chicken genetic resources in an efficient way in Nigeria. The chickendb_ng was developed in an environment running on open-source software known as XAMPP stack [17], located on a database server 127.0.0.1 via TCP/IP. Country Domestic Animal Genetic Resources Information System (C-DAGRIS) was developed in a similar environment running open-source software LAMP (Linux Apache MariaDB PHP and Perl) stack [26]. The third component of the XAMPP stack, MySQL is the Relational Database Management System (RDMS) that will be deployed for the implementation of the chicken database since the project is an open-source; likewise, the Apache Web Server. The administrative tool, PhpMyAdmin in MySQL and MariaDb php will communicate to the backend/MySQL to store, retrieve, and update the system when it is fully implemented.



Figure 13. System overview of chickendb_ng database.

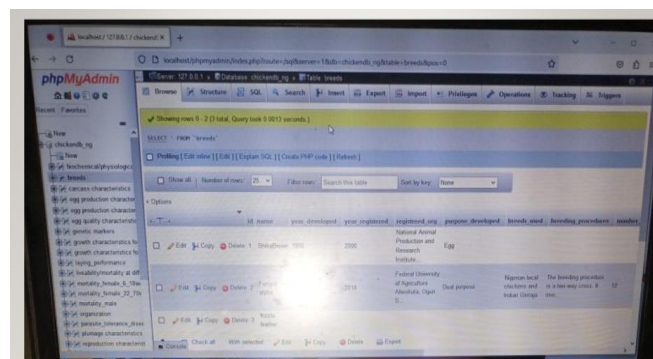


Figure 14. Backend preview of information on Shika Brown® and FUNAAB Alpha® chickens.

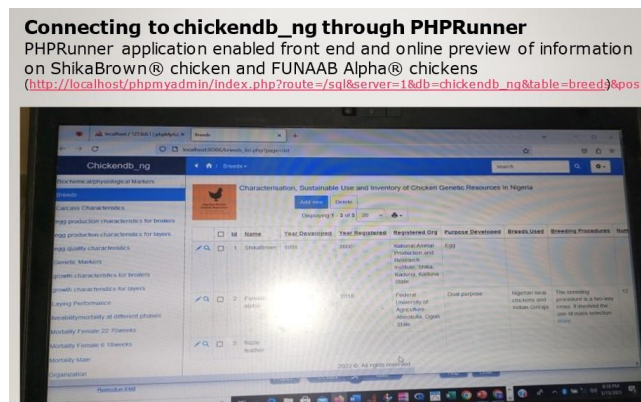


Figure 15. PHPRunner enabled preview of chickendb_ng showing information on Shika Brown® chicken and FUNAAB Alpha® chickens.

The stand-alone chickendb_ng database featuring information on the Shika Brown® commercial layers and FUNAAB Alpha® dual purpose chickens satisfy the clarion-call of Poultry Researchers, Scientists and other stakeholders for the creation of poultry database in the country [16; 15]. Some important chicken breeds such as Assel, Titri, Denki, Ghagus, Ankaleshwar, Busra, Chitagong, Daothigir, Haringhatta Black, Teni, Miri, Punjab Brown, Naked neck, frizzle feather, Nicobari, Tellichery, Kalasthi, Kashmir Faverolla and Kadaknath have been documented in India [23-25]. In Sudan, large Baladi, bare neck and Betwil indigenous chickens were documented by [27]. Also, in China, information is available on some ICs such as Qingyuan, Baijing fatty, Gushiu, native sheak kai, Xiao-shan, Xianju, Linghun, Huiyang bearded chicken, Bayiner, Wenchung, Xingua, Wzgu, YWC strain and Taihe silkies [28, 29]. Information is also available on the ICs of Matrouh, Mandarah, and Fayoumi breeds of Egypt [30, 24], Tilili, Chefe, and Tepi chicken breeds of Ethiopia [30, 24]. Animal (chicken) breeds registration and database system in Nigeria will improve the traceability and food safety in case of food-borne disease outbreak, enhancing consumer confidence in the safety and quality of food products, among other positive implications.

5. Conclusion and applications

Based on the findings from this study, it is established that:

- 1) For poultry production to be more profitable and contribute to export trading in Nigeria, there is a need to improve on the technical (database implementation) and allocative efficiencies for the subsector: the commercial chicken breeds in the open markets need to be registered according to the Nigerian's poultry descriptor.
- 2) Also, the chickens' promoters/producers in the country need to synergize with the relevant government agencies to promote breeds for breed inventory and status monitoring for increased food productivity.
- 3) Implementation of the developed stand-alone chickendb_ng will aid documentation of Nigerian chicken breeds' information and possible integration with other international databases and information systems.
- 4) Chicken breeds database systems may lead to their outputs' growth and thereby strengthen the intra-Africa trade.

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