

## **Preliminary information on the status of sustainable use, characterization and inventory of animal genetic resources in Nigeria**

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**Target Audience:** Animal Genetic Resources Stakeholders, Producers, Policy holders, Private Organizations.

### **Abstract**

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*The full potential of animal genetic resources (AnGR) is not presently realized in Nigeria and urgent response is required to improve the use and development which will subsequently address the current rapid erosion. The prevailing practice around the world is that animals are frequently bred according to the pre-determined breeds' standard set down by the governing Organizations. Indiscriminate animal breeding is however prevalent in Nigeria with numerous and published works on both conservation and characterization of AnGR that were neither documented to local nor International database of animal diversity. Some Universities and Research Institutes have however come up with findings that revealed actual information on economically important animal species and breeds which have not been centralized Nationwide. These include animal population and distribution data, breeding structure and organization, animal performance data, animal reproductive characteristics data, adaptation/tolerance to specific environmental conditions, biochemical/physiological markers and genetic/molecular markers. However, conservation, breeding and registration of both the existing and new animal breeds in compliance with the Nigeria's descriptors format is necessary for the country inventory of animal genetic resources population. Likewise, the characterization and documentation of information on the AnGR into a database is crucial. Structured questionnaires will be administered among the stakeholders to collate data and information on the phenotypic and molecular characterization of AnGR in Nigeria. This strategy will facilitate the harmonization of AnGR information, leading to the registration of both the existing and locally adapted animal breeds in Nigeria; thereby enhancing the National database of animal diversity.*

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**Keywords:** Animal genetic resources, conservation and breeding, registration, characterization, inventory.

### **Description of problem**

Nigeria has a large diversity of animal genetic resources (AnGRs) which are used for food production and agriculture. Millions of limited resource farmers keep livestock and often rely on their animals to provide multiple products and services. The distribution of AnGR varies across the agro-ecological

regions of Nigeria and Africa at large. Livestock currently contributes about 30 percent of agricultural gross domestic product in developing countries, with a projected increase to about 40 percent by 2030 (1). Increasing production of animal products will require more efficient animal management systems, careful husbandry of natural

resources and measures to reduce waste and environmental pollution (1). The sustainable use and development of AnGR in the future is assured by their market preferences, high demand and general adaptability.

Animal breeds and breeding activities aim to improve the genetic quality of production of animals or conserve the genetic resources. This is achieved by utilizing uniform methods for the evaluation and documentation of such animal breeds/strains. The prevailing practice around the world is that animals are frequently bred according to the pre-determined breeds' standard set down by the governing Organizations. British Poultry Standard is the first of such standards (2; 3); Northern American adopts Standard of Perfection amongst others. Office of the Federal Register maintains different Cattle Herd Books such as New Zealand Aberdeen-Angus Herd Book, Irish Angus Herd Book, Herd Book of Hereford Cattle, Holstein UK Herd Book, and so on (4). In Nigeria today, ShikaBrown® chicken remains the first chicken breed registered according to Nigeria Standard of animal registration (5) and lately the FUNAAB Alpha® chicken (6).

Adebambo (7) attributed the problem of livestock breeding and breed development in Nigeria to the non-availability of animal breeding policy, which is to streamline and regulate all breeds and breeding procedures. Lack of professional animal breeders and high level of illiteracy among the livestock keepers who could not be trained in the art of breeding to recognize international standard is another issue facing the Nigerian's animal agriculture (7). According to the second report on the State of the World's Animal Genetic Resources for Food and Agriculture (8), there are no specific genetic improvement programmes for indigenous AnGRs in Nigeria. However, Universities, some private farmers and Research Institutes are involved in systematic breeding while the traditional

livestock farmers may be involved in straight and unstructured breeding systems (8). It is however worthy; noting that there is a Federal Government Parastatal whose mandates is to ensure the animal breeds are bred and registered in compliance with Livestock Descriptors Formats for registration in Nigeria.

FAO (9) recommended conservation, sustainable use and development of AnGR. It further provided the AnGR be characterized and documented for inventory, monitoring of trends and associated risks. Nigeria (10) country report stipulated compilation and regular updating of information on Nigerian's AnGR through publication of Journals/Magazines, and so on. Presently, there is however lack of animal diversity database that neither documents nor disseminates information within Nigeria. DADIS (11) had scanty information on the Nigerian's animal breeds. There is a huge disconnection between data availability and development of livestock breeding programmes, livestock management and livestock Policies in Nigeria. Apparently, Nigeria is in need of pooling data and documenting the available information on AnGR into a National database, further be developed to a Web-based which may later be synchronized with International database. This strategy seeks to sensitize the stakeholders on the needs for harmonization, coordination and documentation of all activities relating to AnGR in Nigeria into a central hub. This will supposedly bridge the existing data gaps on Nigerian AnGR between the key stakeholders, policy makers, and the world at large.

**National effort in the animal genetic resources breeding and registration: case study of National Centre for Genetic Resources and Biotechnology (NACGRAB)**

Generally, most countries understand the roles and values of indigenous breed conservation with regards to the protein needs

of the ever increasing human population, disease resistance and related agro-industrial raw material needs. National Centre for Genetic Resources and Biotechnology (NACGRAB) is a Federal Government parastatal whose major mandate comprises conservation of endangered plant and animal genetic resources for immediate/future utilization and sustainable use. The Federal Government of Nigeria (FGN) against the backdrop of absence of a regulatory Institution on validation and certification of newly developed crop varieties and livestock breeds promulgated Decree No. 33 of 1987 (now amended as Act of Parliament, 2016) to regulate seed, livestock and fisheries industries through its Varietal Release Committee (NVRC). One of the Centre's activities is the coordination of National Committee on Naming, Registration and Release of new Crop Varieties and Livestock/Fisheries breeds through various Technical Sub-Committees. The Centre maintains Genebanks for both PGRs (Plant Genetic Resources) and AnGRs (Animal Genetic Resources) in which the registered germplasms are stored and subsequently evaluated for the performance characteristics, amongst others.

#### **National Varietal and Registration Committee (NVRC)**

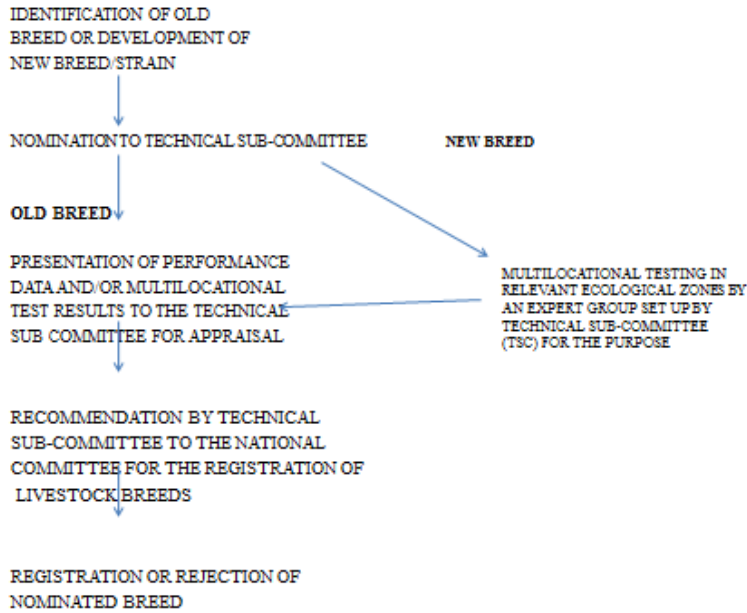
In compliance with the Convention on Biological Diversity (CBD), the Global scenario of trade and property rights elicits the needs for protecting animal genetic diversity. By reason of the law, the registration and certification of animal breeds in Nigeria for

food and agricultural use is vested in the National Crop Varieties and Livestock Breeds Registration and Release Committee coordinated by NACGRAB. Technical Sub-Committees of Livestock/Fishery of National Varietal Registration Committee (NVRC) have compiled various descriptors format for registration of both the existing and new livestock breeds/fisheries into a compendium (12; 13). Apart from aiding supervisory animal breeding activities in Nigeria, it will also facilitate documentation of AnGR information into the National Register/Catalogue and database. Adebambo (7) substantiated that animal breeds registries are not only created for animal genotypes but rather for enhancing proper animal statistical data for the country.

#### **Procedure for registration of Animal Genetic Resources in Nigeria: Descriptor formats for Livestock breeds/strains**

There is provision for registering either the old/existing or new animal breed/strains in Nigeria (12; 13) as shown in the figures 1 and 2 below. Descriptor formats for registering livestock breeds in Nigeria is categorized into two components, consisting the following:

- ❖ General description/ background information of breed
- ❖ Detailed description of breed/strain/line
  - Physical characteristics
  - Performance characteristics (growth, reproduction, carcass, and so on)
  - Biochemical / Physiological Markers
  - Genetic / Molecular Markers
  - Other unique performance characteristics (Specify)



**Figure 1: Flow-chart of recommended procedure for the registration of livestock breeds and strains in Nigeria.**  
 Source: NACGRAB, (12; 13).



**Step by Step Procedure to Register an existing or new animal breeds in Nigeria.**  
 Source: (NACGRAB, 2016; 2017)

**Figure 2: Step by Step Procedure to Register an existing or new animal breeds in Nigeria.**  
 Source: (14; 13).

### **Characterization of Animal Genetic Resources (AnGR) in Nigeria**

The base-line and advanced survey of AnGR populations including the enumeration and visual description, their comparative genetic description in one or more production environments, the valuation and ongoing monitoring of those at risk. The primary motivation for valuing AnGRs is to assist policy development and management decisions. FAO (15) reported the major survey undertaken in Nigeria (16; 17) which covered all the breeds and species available in the country. Similarly, the Honourable Minister of Agriculture and Rural Development (FMARD) presented increase in the livestock population size as contained in the 2011 National Agricultural Sample Survey; reported by the Premiums Times Nigeria (18). Characterization of AnGRs is essential to properly assess the value of breeds and to guide decision making in livestock development and breeding programmes. The global strategy for management of farm AnGRs places strong emphasis on the molecular methods (19) to assist the conservation of endangered breeds and determine the genetic status of breeds.

However, numerous works on phenotypic and molecular characterization of AnGRs have been successfully undertaken, published and awaiting documentation into either local or international database of AnGRs. Some of the numerous studies include Cattle: (20; 21; 22), Sheep: (23; 24; 25; 26), Goat: (27; 28; 29), Swines: (30; 31), Chicken: (32; 33; 34; 35; 36; 37; 38), Guinea fowl: (39; 40), Quails: (41), Horse: (42), Camels: (43), Fish: (44), amongst others.

### **Global AnGR Databank and Documentation of Animal Genetic Resources Information in Nigeria**

The information on the breeds' status within each animal species is of great

importance to the Food and Agriculture Organization; the Global Databank for AnGR had scanty information on the Nigerian's animal breeds (11). The information relates to animal breeds was not fully documented, numbers of different breeds were not indicated. No data on the inventory of the numbers of different breeds, basic and advanced population, morphology, special qualities, performance qualities, their relative importance to conservation and production amongst others (11). Similarly, neither the first nor the second report on the State of the World's AnGR (15; 8) captured the majority of the enormous executed works on AnGRs in Nigeria. Peradventure, if the information on the Nigerian' AnGRs have been pooled into a central hub/database, it would have facilitated easier accessibility for the stakeholders when the need arose. The lapses were due to the uncoordinated AnGR activities by the relevant stakeholders in Nigeria but rather were been coordinated by the Veterinarians for decades. Fortunately for the AnGR stakeholders and country at large, the newly-created Federal Department of Animal Husbandry Services of FMARD from the defunct Federal Department of Livestock and Pest Control Services now coordinates activities of animal husbandry in Nigeria. Through the department activities, the Global AnGR databank was accessed and AnGR status list in Nigeria was known.

### **Coordination of AnGR management in Nigeria and updating of Global AnGR Databank, Domestic Animal Diversity Information System (DADIS)**

The coordination of AnGR management is vested in the Federal Department of Animal Husbandry Services (DAHS) of FMARD who also doubles as the FAO representative for the AnGR management in Nigeria. One of the activities of the DAHS is to document and regularly update the information on AnGR for the Country each time a new breed/strain of

animal is registered and released for public use or as requested by the Commission on Genetic Resources of Food and Agriculture Organization. The Pioneer Director of the DAHS synergized with NACGRAB to ensure the Global AnGR databank, DADIS was updated regarding the information on Nigerian's AnGR but was grounded to a halt due to non-availability of National database on AnGR information.

### **Information Gathering on the Animal Genetic Resources to develop National Database of animal diversity**

Towards developing the National database for animal diversity, the strategy will involve utilizing various resources for gathering data and information on the AnGR in Nigeria; they are as follow:

#### ▪ **Questionnaire Administration**

Structured questionnaire will be administered among the AnGR stakeholders in Nigeria. This is necessitated to gather available information on the existing, locally adapted and recently introduced AnGR in Nigeria. The questionnaire will be designed using the Nigerian Standard of Animal Registration, the Descriptors formats for Livestock breeds registration in Nigeria (12; 13) as a guide.

#### ▪ **Literature Search and Review of Curriculum Vitae (CV) of Scholars on the Conservation and characterization studies of Nigerian Animal Genetic Resources**

This aspect seeks to gather available data and information on the Nigerian AnGR through the search of various and reputable journals that publish novel animal research findings home and abroad. In similar manner will the curriculum vitae (CV) of distinguished Scholars of Animal Breeding and Genetics, Production and Health, Physiology, Nutrition, Molecular Genetics, Biotechnology,

Bioinformatics, and others across the Universities, Research Institutes, Colleges of Education, Private Researchers, Non-Governmental Organizations (NGOs) amongst others be reviewed. Aspects of conservation, phenotypic and molecular characterization of different Nigerian AnGR will be reviewed; forty and twenty years in retrospect respectively. For effective, precise and faultless reports, Post Graduate Students of Faculties/Departments of Animal Science in Nigeria will be outsourced for the National job.

#### ▪ **Guidelines for the publications' review and others**

The Descriptors format for Livestock breeds registration in Nigeria (12; 13) will serve as a guide for gathering the required data and information. In like manner will the other vital information came across in the course of the review be documented for future use.

### **Conclusion and Applications**

1. The pooled data and information on the conservation and characterization of Nigerian AnGRs will be documented into the Domestic Animal Diversity Information System (Dad-is) of Food and Agriculture Organization (FAO).
2. Documentation of data and information on the Nigerian AnGRs will be executed in collaboration with the FAO Nigerian's AnGR Coordinator whose responsibility is to periodically update the international database for the country.
3. Documentation of data and information on the Nigerian AnGRs to the proposed National database will be executed by National Centre for Genetic Resources and Biotechnology, Federal Ministry of Science and Technology.

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