REPORT OF THE FIRST ANIMAL GENETICS RESOURCES (AnGR) EXPERT ROUNDTABLE MEETING HELD ON 10TH MAY, 2017 AT NATIONAL BIOTECHNOLOGY DEVELOPMENT AGENCY, ABUJA, NIGERIA.

INTRODUCTION

The above expert roundtable meeting which was organized by the Animal Genetic Resources Project team of the Department of Bio entrepreneurship and Extension services, National Biotechnology Development Agency (NABDA), brought together experts from Tertiary institutions, Academic research community, Civil Society, Professional organizations, the media, Government Agencies and Parastatals.

OBJECTIVE

The objective of the meeting was to establish an Animal Genetic Resources Peer Review Research Platform (APERREP). The goal is to build a consensus, common understanding and ensure that NABDA sets the right research agenda in leading research for development on Animal Genetic Resources. The focus is to propel value addition and ensure that the infrastructures needed in a national AnGR reference laboratory are made available as a prerequisite for the agency to be providing national clearing housing mechanism on AnGR projects. In line with the foregoing, a technical session was held and Eight (8) papers were presented as follows:

<table>
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<th>ITEM OF DISCUSSION: PAPER I;</th>
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<td>“The Status, Best Practices And Success Stories In The Collection And Preservation Of Bull Semen and other Genetic Resources in Nigeria”-</td>
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<tr>
<td>Professor P.P Barje, National Animal Production Research Institute (NAPRI), Zaria</td>
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**DISCUSSION:**

The presentation was aimed at reviewing semen collection and preservation activities of cattle in Nigeria. In his presentation, Professor P.P Barje discussed extensively, Nigerian Livestock and poultry population. He asserted that Nigeria has four breeds of sheep and three breeds of goats in Nigeria, which are the Yankasa, Balami, Uda and the West African Dwarf; Red Sokoto (Kano Brown), Sahel and West African Dwarf respectively. He highlighted issues on the poor performance of livestock in Nigeria which are; Poor genetic management of our animals, low levels of nutrition, animal health problems, poor management and husbandry practices and low level of production of our indigenous animals. Professor P.P Barje then gave a brief history, objective and challenges faced by the Shika Chicken breed stock farm which was established in 1928 by the north region Department of Agriculture. Speaking on Artificial Insemination (AI), he restated the mandate of National Animal Production Research
Institute (NAPRI), Zaria. Professor P.P Barje stated that semen has successfully been collected from the breeds of sheep, goat, cattle and avian species. He concentrated more on the collection of Bull semen from NAPRI using three different techniques; Artificial Vagina (AV), Electro Ejaculator (EE), and Rectal Massage (RM). He concluded that AV is the best in terms of accuracy and does not impose any form of stress on the bull as does the EE. He also discussed semen evaluation and its importance as it helps in the determination of fertility, foreign objects, colour, volume, concentration, motility and mortality.

Professor P.P Barje specified that the need to process semen is to maintain semen fertility, concentration, pH, and to stabilize cell membranes among others. He dwelt more on the extenders, which are the egg yolk-citrate, egg yolk-phosphate and homogenized milk extenders. He continued by asserting that semen can be preserved for short or long period depending on the method of preservation and that it could also be chilled for 3-5days with an extender at 37°C and cooled at 4°C for at least one hour. Other methods as mentioned are frozen and room temperature preservation. He revealed that major challenges to semen collection and preservation are; high cost of infrastructures, indiscriminate importation of frozen semen from unconfirmed sources, indiscriminate crossbreeding of indigenous breeds with exotic breeds and unstable government policies.

**REMARK:** Cattle semen collection and preservation national protocol including Standard Operating Practices can be achieved.

**RECOMMENDATION:**

Professor P.P barje recommended that there should be a policy guiding importation of semen, provision of AnGR management infrastructure and stoppage of indiscriminate crossbreeding.

**ITEM OF DISCUSSION: PAPER 2;**

Rabbit and Chicken Semen: Collection, Evaluation And Preservation Trials - **Professor S. Idowu Ola PhD,** Animal Reproduction Laboratory, Department Of Animal Sciences, DAU Ile Ife, Nigeria.

**DISCUSSION:**

The researcher commenced with the explanation on the origin, domestication, population and genetic diversity of rabbits in Nigeria. Regarding semen collection for artificial insemination, he gave a comprehensive detail on the available and affordable protocols and instruments. A case was made on the use of Olirav- an innovatively produced rabbit artificial vagina for rabbit developed but not yet patented by the researcher. He added that artificial vagina could be fabricated with syringe and latex condoms in the absence of the imported ones, and also confirmed through different researches that the efficiency of Olirav has no significant different compared to the imported artificial vagina in terms of volume, ejaculate lag, sperm motility, sperm concentration, live spermatozoa and abnormal spermatozoa however Olirav is better in terms of collection period. He also discussed the Rabbit Semen Collection for artificial insemination, Protocols and Instruments, Rabbit Semen Preservation Protocols, Trials and Success rate.
He later spoke extensively as regarding research work on chicken semen collection, evaluation and preservation.

**REMARK:** National protocol and SOP for rabbit semen collection and preservation can be achieved through the Peer review research platform and harmonization by researchers.

**RECOMMENDATION:**
Professor S. Idowu Ola recommended:
- The optimization on trial of rabbit and cock semen extension, which with readily available diluents has shown promising results.
- Attempts should be made at longer term preservation, using the already tested and other possible protocols.

**ITEM OF DISCUSSION: PAPER 3;**
“Status, Best Practices and the Success Stories in the Collection and Preservation of Avian Species Semen” - **Professor Udo Herbert**, Michael Okpara University, Umudike.

**DISCUSSION:**
Using simple terms, Prof. Udo Herbert began his presentation by expressing the fact that the poultry male and mammalian male reproductive tracts are different but them both produce semen. He advised that precautions should be taken by avoiding cold shock, analyzing promptly, and storing well for artificial insemination. After giving a brief history on semen collection in poultry, he stated that at present, the collection of semen cannot be an impediment to research or production. He then spoke on the procedure for semen collection, handling and storage in poultry which includes; the hand massage and ejaculation through phallic tumescence. He stressed that the cloaca should not be touched during semen collection because it may decrease the semen volume. He also added that if too much pressure is applied or collection done frequently may result in bleeding and blood visibility in the semen thus the need for proper training of operators. Other points discussed include; semen examination, dilution and preservation. He concluded that, poultry semen can easily be collected from various species and strains of poultry raised in Nigeria.

**REMARK:** National SOP for Avian spp semen collection and preservation is achievable.

**RECOMMENDATION:**
Professor Udo Herbert recommended that careful planning; strategic research and development should be adopted to overcome the challenges with preservation of poultry semen. Provision of required infrastructure for preservation must be given its priority.
ITEM OF DISCUSSION: PAPER 4;
“Semen collection evaluation and preservation in rams”- Professor Danjuma Zahraddeen, Environmental/Productive Physiology Unit Department Of Animal Science, Faculty Of Agriculture, Ahmadu Bello University, Zaria, Nigeria.

DISCUSSION:
Professor Danjuma Zahraddeen defined semen as the fluid that carries the male germ cells; the mature forms known as spermatozoa. He spoke on the components of semen and the techniques, in order of quality of semen harvested. These are; Artificial vagina (AV), Electro-ejaculation (EE), Rectal massage/palpation, Dummy and Recovery methods. Professor Zahraddeen explained that there are various techniques in evaluating semen which are the physical, morphological, biological, analytical, metabolic and microbiological tests. He stated that it is impossible to harvest semen specimens free from bacteria, which are present at a varying extent in the prepuce and that it has been observed that not only pathogens but other microflora can have adverse effects on the fertility of semen by the production of toxins, putrefaction of diluent components of biological origin and by the utilization of metabolic substrates. In discussing the preservation of semen, Professor Danjuma Zahraddeen defined Extenders/diluents, he stated that The commonly used diluents in rams under tropical environment include; Skin milk extender, Cornell University Extender (CUE), Whole milk glycerol extender, Soymilk glycerol extender, Soymilk extender and Egg yolk extenders. He explained various semen storage methods, which include the chilling and freezing methods. He also discussed semen packaging methods such as Ampulles, straws pellets; thawing methods which are; Dry and solution thawing. He stated that in Post thawing incubation period, the longer, and the poorer. As regards methods of insemination, he emphasized that the Surgical procedure is better than cervical in ewes and sow.

REMARK: National SOP is achievable for collection and preservation of ram semen.

RECOMMENDATION:
Professor Danjuma Zahraddeen recommended that the end target of any semen collected, evaluated, preserved and stored should be to have a successful artificial insemination (AI) and that should be kept in focus all through the process.

ITEM OF DISCUSSION: PAPER 5;
“The Collection and Preservation Of Goat Semen In Nigeria” - Dr. James Ola. Daramola (Associate Professor), Department Of Animal Physiology, Federal University Of Agriculture, Abeokuta, Ogun state, Nigeria.
**DISCUSSION:**

Dr. James Ola. Daramola, an Associate Professor in Reproductive Physiology began his presentation with a comprehensive description of the adaptive characteristic features of the West African Dwarf (WAD) goat. He spoke extensively on the use of electro-ejaculator and artificial vagina for semen collection. He stated that the Doe may not necessarily be on estrus or heat in the use of artificial vagina. Regarding semen evaluation, he explained the subjective (microscope) and objective (CASA) methods, considering parameters such as Sperm motility, Live/Dead ratio, Sperm abnormality, Acrosome integrity, Membrane integrity, Malondialdehyde concentration activity, Acrosin activity, In vitro capacitation and In vitro acrosome reaction. He stated that these parameters determine the viability of the semen after cryopreservation. In discussing the methods of semen preservation, he gave a detailed and comprehensive discussion on Liquid storage; Refrigeration for short period (1-4 days) at temperature of 4 or 5°C and Cryopreservation (long term storage of semen at -196°C). For cryopreservation method, he explained; Conventional Control (slow freezing); Conventional Vitrification (rapid freezing-solidification without crystal ice formation) and Open Pulled Straw Vitrification (rapid freezing-loading by capillary action). Dr James Daramola also explained in details, procedures for cryoprotocols in conventional cryopreservation, conventional vitrification and open pulled straw vitrification after which, he gave a clear and interesting description of washing protocols. Other studies done, with their protocols, findings and sources were also cited by him. Finally, Dr James Daramola spoke extensively on semen extenders, stating the specific limitations to successful preservation of goat semen using conventional extenders.

**REMARK:** National semen collection and preservation protocols for goat semen are achievable through continuous peer review research.

**RECOMMENDATION:**

Particularly on the Strategies that should be put in place to make semen preservation sustainable for increased productivity, Dr. James Daramola recommended:

- Diagnostic survey for determining existing location and population census of goat.
- Research focused on validation of techniques for the collection and preservation.
- Adequate & sustainable AI facilities (LN2, CASA etc)
- Establishment of goat herd for foundation stock in research stations/universities.
- Cryopreservation of goat germ-plasms through the use of various cryoprotocols.
- Release of cryopreserved proven semen for AI and embryos to end users in Nigeria.
- Training of technicians in the art of cryopreservation of goat germplasm for AI.
- Publication of such findings for awareness and knowledge
- Replication of research across the agro ecological zones of the country especially where they are well-adapted.
Adoption & utilization of research findings.

**ITEM OF DISCUSSION: PAPER 6;**

“Collection and Preservation of Pig Semen: Available Technologies and Techniques” - Dr. Jide Sokunbi, Animal Physiology Unit, Department of Animal Science, University of Ibadan, Oyo State, Nigeria.

**DISCUSSION:**

Dr Jide Sokunbi spoke extensively on herd uniformity. In explaining various methods of semen collection, he gave available techniques such as the Gloved hand collection and Automation (using an artificial cervix). As regards the Gloved Hand Collection, he explained Sperm-richness and post-sperm fractions (prostate fluid, seminal vesicle fluid and sperm cells), showing pictures of a locally fabricated mount, a locally modified refrigeration (thermo-regulated at 17° C, automation using artificial cervix. Dr. Jide Sokunbi also discussed, semen processing, considering parameters such as the Volume, Motility, Concentration/Number, Number/Insemination and Rate of Dilution. He also showed some pictures to assert his position on the pig semen processing.

Dr Jide Sokunbi stated that his research effort in this area is presently focused on evaluating the:

- antibacterial and anti-oxidative potentials of local botanicals such as Neem (*Azadirachta indica*) leaf and Scent (*Ocimum gratissimum*) leaf
- antioxidative potentials of fruits such as tomatoes and water melon
- Cryoprotective potentials of honey and aloe vera.

However, he stated that there are certain challenges which include inadequate research facilities and funding. He also emphasized the need for semen preservation which are for commercial purposes (Liquid semen) and Gene banking (Cryopreservation).

Dr Jide Sokunbi then stated the problems with cryopreservation of pig semen, which are: large fractional ejaculates and cumbersome cryotechnology that has prevented its commercial application.

**REMARK:** The session is timely and it is a step in right direction in the development of boar semen collection and preservation protocols in Nigeria.

**RECOMMENDATION:**

Dr Jide Sokunbi recommended certain steps for Setting up a Gene Bank for Pig Semen in Nigeria, which are as follows:

- Review of existing protocols and strategies in Europe and elsewhere
- Identification and characterization of boar studs (breed) across the six geo-political zones
- Establishment of semen collection, processing and preservation centres across these zones
- Review of emerging challenges and appropriate modifications integrated into the project.
- Establishment of semen gene bank(s)
ITEMS OF DISCUSSION: PAPER 7;
“Status & Best Practices In The Collection And Preservation Of Animal Genetic Resource Inputs For Strategic Breeding In Nigeria”-
Professor Ikenna S. Omeje, PhD; National Coordinator, Animal Breeder’s & Geneticists’ Network-Nigeria (ABGeN-ng); Professor of Animal Breeding & Genetics, Department of Animal Science, Delta State University, Asaba Campus, Delta State, Nigeria.

DISCUSSION:
This presentation was aimed to examine Global and Nigeria’s standings on practices in the preservation of Animal Genetic Resources, intended for utility under different or integrated country-wide breeding strategies.

In his introduction, Professor Ikenna Omeje stated that all sovereign states under the Food and Agriculture Organisation (FAO) charter recognizes the importance and use of their respective farm animal genetic resources (FAoGR) as the natural dependable “fall back” or last resort endowment for animal growth and development in food needs and security within national economy context. He continued by emphasizing that conservation of all FAoGR for future use should be priority in meeting the food (nutritional) demands and food security needs of a country. He therefore offered his apologies, stating that the time to record a success story on mainstreaming efforts for Nigeria, in her attempt at FANGR collection and preservation status is not now, but yet to come because the nation will soon be at the brink of a coordinated and institutionalised process of FANGR collection and preservation, as part of the implementation of national animal breeding policy that will be underway shortly.

Professor Ikenna Omeje analysed and reviewed in his presentation, the global status of FANGR, using the The global FAO’s 2nd Report on the SDWAnGR (State of the World’s Animal Genetic Resources for Food and Agriculture (FAO, 2015; 2017; www.fao.org/AG/AGAInfo/resources/en/pu)). This he used to also compare, review and critically analyze the status of Nigeria’s FANGR. He stated that the recorded facts on the prevailing population status of Nigeria’s farm animal genetic resources are from the FAO in collaboration with the Federal Office of Statistics, Abuja. A table showing the Species-based Food and Agriculture Data (FAOSTAT 2012) on Nigeria was analyzed and it was deduced that although there are over 16 million cattle, yet more than 83.30% of the total import spendings are made on the large ruminants and their products. Percentage costs on Chickens, Sheep, Pigs and goats come far next in that order with 5.98%, 4.04%, 3.68%, and 3.00% respectively.

Professor Ikenna Omeje highlighted on the Species-wide Status on Identified Farm Animals in Nigeria: Cattles, goats, sheep, swine, poultry, rabbits, snails, grass cutters were the identified farm animals discussed. He then gave a brief chronicle on efforts at collection and preservation/conservation of
Nigeria’s FANGR; reports on achievements, research and development results of some Nigerian researchers and experts on AnGR were presented. He stated that the cross breeding and straight breeding as the two basic animal breeding systems possible for Nigeria. other Issues he discussed were the Breeding Strategies as given in the Vision 20:2020 and Proposed National Animal Breeding Policy for Nigeria, Criteria for achieving the desired breeding goals, pure breeding, inbreeding, close breeding, line breeding, other breeding systems, steps of the two breed and three breed rotation.

REMARK: Implementation of Global Plan of Action though belated in Nigeria is a strategic pillar for sustainable livestock breeding for productivity.

RECOMMENDATION: Professor Ikenna Omeje hereby recommended that as a Country, we should strive to achieve a more coordinated and institutionalised process of FAnGR collection and preservation.

ITEM OF DISCUSSION: PAPER 8; “Importance Of Animal Genetic Resources AnGR In Livestock Productivity And Resilience In Nigeria”- Dr Ademola M. Raji, Former FAO National Coordinator AnGR, Nigeria.

DISCUSSION: The objective of this presentation was to highlight and discuss extensively, the importance of AnGRs in livestock production and the need for their conservation. In his presentation, Dr Ademola Raji defined Animal Genetic Resources; he explained their value and contribution to food and agricultural production. He also mentioned that AnGRs in their natural habitats are valuable for their aesthetic values, their potential uses by humans, and for maintaining functioning ecosystems but special considerations are needed for protecting the biological and habitat diversity. Dr Ademola Raji then added that animal genetic diversity is critical for food security and rural development. However, such developments are totally dependent on the availability of genetic resources which must be maintained as an investment for the future.

In discussing the importance of AnGRs in livestock production and the need for their conservation, Dr Ademola Raji enumerated the value of AnGRs as biological materials, the genetic status and distinctiveness of AnGRs as breeds, scientific purposes, cultural-historical and aesthetical importance, and possibilities of evaluation, maintenance and availability of adequate information. He gave an elucidating report on resilience, which is the adaptation of AnGRs to climate change. Using the report from FAO, 2009: AnGRs diversity may become even more important in the future as farmers and breeders face the challenge of adapting their animals to ever changing socio-economic demands and environmental conditions. include possible adaptation to climate change: Livestock can play an important role in both adapting to climate change and mitigating the effects on human welfare. He emphasized the urgent need for effective strategies for adapting to climate change which is occurring faster than the
adaptation; One of the numerous strategies for livestock adaptation to climate change is conservation of genetic diversity. Livestock production contributes to and is also affected by climate change. Dr Ademola Raji also spoke on the impacts of climate change on AnGRs and threatened genetic resources. On giving the strategies for conserving Animal Genetic Resources, Dr Ademola Raji mentioned two approaches, which are the in-situ and ex-situ conservation. He added that the In-situ and ex-situ conservation schemes are complementary with their application for a particular animal genetic resource and that frozen germplasm can also play an important role in the support of in-situ breed development strategies. Dr Ademola Raji also discussed the FAO efforts in the management of AnGR; Global Plan Action for management of AnGR (FAO, 2007). He also spoke on enhancing livestock productivity through better reproduction, breeding management and Possible utilization of small population of living livestock. As regards the coordination and management of Animal Genetic Resources in Nigeria, he stated that the Serving Head, Department of Animal Husbandry & Production Services (Federal Ministry of Agriculture and Rural Development) is the National Coordinator of AnGR in Nigeria.

**REMARK:** Domestication of Global Plan of Action is feasible in Nigeria leading to the Development of National action plan and Strategies.

**RECOMMENDATION:**
Dr Ademola Raji recommended a continuous research, strategies, conservation and coordination in ensuring the productivity and resilience of Livestock species in Nigeria.

The participants acknowledged:

- The issue of policies and legislation as expedient to carry out Animal Genetic Resources research and development, and as well, check some questionable importations. The new National livestock breeding policy presently in the process authorization is strategic to national AnGR development.
- The need for institutional re-settings so that researches done in tertiary institutions especially at post graduate levels be geared towards AnGR for national development.
- The need for an immediate animal census to identify livestock species and their genetic resources
- The need for resource stock taking in the universities, institutions and organizations in Nigeria, to know available infrastructure, capacities and human resources available within the country.
- The need for professional capacity building of scientists, researchers and other relevant skill settings.
We hereby agreed:

- That all experts should work together through a single platform that would be ICT driven named **Nigeria AnGR Peer Review Research Platform (NAPERRP)** for research results aggregation, coordination, data banking, information exchange and continuous engagement among members. The Platform should be developed and managed by NABDA/AnGR Nigeria Project lead.

- To commence the actualization of this, Post graduate research work on AnGR subjects from different laboratories will be uploaded on the platform.

- That there is need for joint proposals for research work and project funding, both from international and national bodies.

- That a good number of Post graduate research work will be tailored towards Animal Genetic Resources (ANGR) yearly.

- There should be continuous capacity building and resource stock taking in the participating laboratories.

- That National Biotechnology Development Agency (NABDA), should provide Reference Laboratory facilities for researches on Animal Genetic Resources, Nigeria.

- That the Director General of NABDA should use her esteemed office to continue to display support to ANGR, both nationally and internationally.

- That NABDA should serve as a data collation, processing and distribution centre for ANGR, in Nigeria (Provide clearing-house-mechanism of ANGR in Nigeria).

- That the platform should be able to accommodate other interested researchers of ANGR across the world.

- That there should be a continuous engagement of experts to be led by NABDA at least, once a year.

- That NABDA should organize livestock species specific stake holder’s engagement for different species of economic interest in Nigeria.

**Action points include:**

- **Preparation of joint project proposal for funding.** An existing proposal between NABDA (Dr M. A. Popoola) and OAU(Assoc. Prof. S.I. Ola) can be upgraded and reviewed by all experts for renewed fund sourcing.

- **Resource stock taking of all participating lab and publication of findings on the platform for common knowledge of the members.**

- **Asset and benefit sharing of available resources in all participating labs be given priorities.**
• Post graduate training/ thesis should be market driven, within the ANGR context.
• Continuous capacity building for all researchers on AnGR through train the trainers and information sharing methodologies.
• The need for experts to ensure the country fulfill the requirements by F.A.O. that will attract the needed supports for AnGR projects which include:

• Inventory, Characterization of the animals, Monitoring of trends, Associated risks of Animal genetic resources
• Sustainable use and development
• Conservation of AnGR
• Policies & institutional framework development.

Signed
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