Research Activity Outline
(To be used for planning of research activities within larger (donor) funded projects)

1. General Information

Concise but explicit title for the research activity:

Assessing the baseline productivity of native chickens from different ecotypes adapted to highlands conditions

Name of the project this research activity contributes to:

PIP CC R & D Programme/PIP Livestock (can also be supported by R & PC)

Which associated project outputs does this research activity relate to:

PIP CC R & D CRA programme output 1.4.5: Establishment of foundation village chicken breeding stock for breeding and distribution

Livestock PIP

Research activity Leader and other team members:

Jeremiah Ahizo *et al.*

Estimated duration of the research activity:

18 - 24-months (1.5 - 2 years)

Estimated total budget:

PGK20,000.00

2. Introduction

- Village or native chickens are known for their hardiness and their ability to adapt well to a range of environmental settings. Their adaptation capability to different feeding and breeding conditions and their high capacity for converting indiscriminate feed sources through scavenging surpasses other exotic breeds that require superior feed sources. Their brooding behaviour is another natural opportunity, as they can perpetuate generations for years without artificial incubation. It is simple to establish or re-establish flocks of these birds with minimal inputs enabling village chickens to be an ideal intervention for impoverished communities.

- These birds are immune-competitive and hardy enough to adapt to the environs of scavenging production systems. However, they often exhibit low productive performances including slow growth, late maturity, poor egg production and high mortality (Menghesa, 2012). Hence, the need to understand if incremental improvements to their status in management can improve their productivity. This will enable the development of appropriate research and development strategies in breeding and improvement for local chicken production.

- According to FAO (2011) genetic resources are among the most valuable assets that a country holds, and it is their responsibility to conserve, maintain, sustainably utilize them. However there have been no serious efforts on the utilization of this important animal genetic resource (AnGR) apart from the effort of Lobao (2011) who did a phenotypic characterization study on local chicken population from three provinces in PNG. Research is necessary to establish baseline data on the growth and productivity of local chickens for future breeding and improvement.

- This study is consistent with NARI's focus on improving animal genetic resources under its priority 2 area for resilient systems, through collection, evaluation, and conservation of genetic resources. The overall objective is to identify and generate information on local chicken diversity and their production capacity for future breeding and improvement as well as conservation of this important AnGR.

- The research questions are: (1) what village chicken ecotypes are available on-station? (2) what is their production capacity i.e., egg production, hatability, etc.? (3) can their growth and productivity be improved when subjected to improved managment and breeding programs? (4) How distinct or similar from each other are these village chicken ecotypes based on their morphological traits?

3. Strategic Objective

State the Strategic Objective – this should be one concise statement expressing what will have been achieved with the successful completion of the study.

- Information on the status and diversity of village chickens, as well as their productive capacities available for breeding and development programs as well as for conservation efforts.

4. Major Output(s)

State the major output(s) to be delivered from this study/research activity (Research outputs are but not limited to: a technology, best practice, a new variety, livestock breed, new information, a strategy, policy recommendations, a new approach, business model, lab method/assays, guidelines, decision-support tools, improved understanding, evidence of profitability, effectiveness, feasibility etc., tools to measure, assess, record, monitor etc., maps, inventories, management package, regulatory framework, standards, a network, etc).

The expected major outputs of the proposed study include but are not limited to;

- Information on the status and diversity of local chicken ecotypes available for the highlands region.
- Baseline information on growth and production potential of identified village chicken ecotypes established for highlands conditions.
- Breeding stocks of improved village chicken ecotypes and/or their crossbreds available on-station for additional research or distribution.
- Phenotypic information and descriptor list as well as guidelines for phenotypic characterization of village chicken ecotypes adapted to PNG conditions available.

4. Research Methods, Tools, and Materials

1. Type of research

On-station trial		**On-station livestock/fish trial**	X	**Economic studies**	
Laboratory trial		**Survey/PRAP***		**On-farm**	

Tick appropriate box(es) *Specify Type:* _____

*Participatory Rural Appraisal and Planning

1. Describe the research methods, tools, or approaches to be used in this study.

- In this study, various village chicken ecotypes will be sourced and phenotypically characterized on-station as per guidelines developed by Cuesta (2008) and FAO (2011). This information will be essential for (1) planning and management of poultry and, (2) for subsequent breeding and development work on this important AnGR.

- Hereafter, all village chicken ecotypes will be subjected to the same dietary and husbandry practices and baseline data will be collected on growth and production parameters over consecutive production cycles. This data will then be used forselcting and delineating breeding lines for breeding and improvement studies. Here, the F_1 generations will be evaluated against the baseline and village

chicken ecotypes with promising growth and production attributes will be utilized through breeding to potentially improve the performance of subsequent generations.

2. Describe the materials and protocols to be used in this study/research activity.

- Various local chicken ecotypes available on-station (or in the highlnds if possible) will be characterized phenotypically to form part of the foundation parent breeding stocks on-station. As described earlier, baseline information on their growth and production potentials will be established and subsequently exploited to potentially improve the production capacities of ensuing generations. The proposed study will be conducted using available facilities on-station. Moreover, a descriptor list and guidelines for phenotypic characterization of village chickens (Cuesta, 2008; FAO, 2011) will be adapted for use in this study.

3. Describe the design of the research (experimental design, number of sites, reasons for selecting sites, treatments, survey design etc., include skeleton ANOVA if applicable).

- The later phase of this study will involve a Complete Randomized Design (CRD) involving the F_1 generation of at least three village chicken ecotypes and four replicates using existing facilities on-station. However, this may change depending on the number of ecotypes identified. Alternatively, these chickens will be subjected to various feeding regimes using local feedstuffs and concentrates, and their production potentials and costs involved established.

Table 1. Skeletal ANOVA of the proposed study in CRD with three* village chicken ecotypes and four replicates.

Source of variation		Degree of freedom
Treatment	t -1	3-1= 2
Error	t*(r -1)	3*(4 -1) = 9
Total	rt -1	(4*3) -1 = 11

*Subject to change, including number of replicates, depending on the number of ecotypes identified.

4. Attach a sample survey tool (if applicable)

- Not applicable in this proposed study.

5. Data collection and analysis

Describe what data to collect and how; What is the planned type of analysis of the data and information collected.

- The following data will be obtained under the proposed study on various village chicken ecotypes.
    - Information on morphological traits of available village chicken ecotypes obtained using FAO (2011) guidelines for phenotypic characterization of indigenous poultry.
    - Data on growth and production capacity of each village chicken ecotype (on various feeding regimes) established.
        - Feed conversion efficiency (egg weight/feed intake, body weight/feed intake, etc.)
        - Growth rate (weekly body weight and weight gain)
        - Egg production (laying rate, egg weight, etc.)
        - Hatchability and chick survival rates
        - Age at first drop or first lay

- All production and feed costs will be observed to determine whether this activity can be operated sustainably as a business model on-station.

- All data will be sorted in Ms Excel and analysed using cluster or principal component analysis (as in Lobao, 2011) and a one-way ANOVA in GenStat or R statistical package.

6. Reporting and types of publications

What are the planned publication products to be produced?

- Journal publications, technical bulletin and reports, and training manual etc.

7. Peer review and endorsement

Name of colleagues, name of organisation, position within the organisation; Presentation at Centre seminars and discussion (NARI Centre, date of presentation, staff present); Other forms of review:

- Peer reviewed by NARI HRC Tambul colleagues.

8. Reference

1. Cuesta, L. M.2008. Pictorial guidance for phenotypic characterization of chickens and ducks. FAO. GCP/RAS/ 228/GER Working Paper No. 15. Rome.

2. FAO. 2011. Guidelines on phenotypic characterization of animal genetic resources. Available at http//: www.fao.org/dad-is. Accessed 21 May 2022.

3. Lobao, M. 2011. Phenotypic characterization of native chickens in PNG using principal component and cluster analysis. Masters Theses, School of Environmental and Rural Science, University of New England, Armidale, NSW, Australia.

4. Menghesa, M. 2012. Chicken production scenarios and the headway options for improvement in Ethiopia. World's Poultry Science Journal, 68 (2): 299-305