

Research Application Summary

Marker-assisted breeding of selected native chickens in Mozambique and Uganda

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Abstract

Native chickens contribute significantly to the well-being of rural farming communities in low-income countries and particularly so in poverty stricken regions of Mozambique and Uganda by providing protein and micronutrients. These are special as they are frequently the only livestock under the control of women. The majority of smallholder farmers raise native chickens for food and income as they do not require special management, require low investment, need limited pest control, provide manure and enhances poverty alleviation and food and nutrition security. However, compared with commercial chicken breeds, low productivity remains a key constraint due to the relatively small body size and low egg production of native chickens. Currently, native hens are characterised by low laying intensity and slow growth rates. The low rate of lay is due to several factors including low genetic potential, seasonal effects, low levels of nutrition and broodiness. By increasing the body weight and egg production of the native chickens the project will contribute to increased availability of meat and eggs for smallholder and medium scale chicken farmers, particularly women and youth, chicken traders and chicken consumers, thus making a significant contribution to food and nutrition security and improved livelihoods of especially rural communities. This action will be implemented by Eduardo Mondlane University (Mozambique), collaborating with Gulu University, Makerere University (Uganda), Women of Uganda Network (WOUGNET), and International Rural Poultry Centre (Mozambique). Associate partners are Agriculture Research Institute of Mozambique (IIAM) and Chick Masters Limited (CML). The partners will bring expertise in chicken genetic improvement, disease control, feed development, engaging women/youth farmers, and harness the available scientific and technological capabilities of the partners' networks; to deliver an innovative and sustainable chicken production system. In this action we will: (1) Determine the genetic composition of native chicken ecotypes in Mozambique and Uganda; (2) Identify native chickens with genes for fast growth and high egg production; (3) Develop native chickens with high body weight, high egg production, reduced broodiness and survival under extensive system in Mozambique and Uganda; (4) Evaluate diets based on scavenging feed resources; (5) Identify and characterise causes of mortality in native chickens and (6) Assess the effectiveness of different technology delivery models for scaling up native and crossbreed chickens production.

Key words: Rural chickens, Food and nutrition security; Women's empowerment; Chicken genetic improvement

Résumé

Les poulets indigènes contribuent de manière significative au bien-être des communautés rurales paysannes dans les pays à faible revenu et en particulier dans les régions pauvres du Mozambique et de l'Ouganda car ils fournissent des protéines et des micronutriments. Ceux-ci sont particuliers car ils constituent le plus souvent le seul bétail sous le contrôle des femmes. La majorité des petits exploitants agricoles élèvent des poulets indigènes pour l'alimentation et générer des revenus, car ils ne nécessitent pas des gestions spéciales, nécessitent peu d'investissements, exigent une lutte antiparasitaire limitée, fournissent du fumier et accélère la réduction de la pauvreté et la sécurité alimentaire et nutritionnelle. Cependant, par rapport aux races des poulets commerciaux, la faible productivité reste une contrainte majeure en raison de la taille corporelle relativement petite et de la faible production d'œufs des poulets indigènes. Actuellement, les poules indigènes se caractérisent par une faible intensité de ponte et des taux de croissance lents. Le faible taux de croissance est dû à plusieurs facteurs, notamment un faible potentiel génétique, des effets saisonniers, de faibles niveaux de nutrition et de couvaision. En augmentant le poids corporel et la production d'œufs des poulets indigènes, le projet contribuera à accroître la disponibilité de viande et d'œufs pour les petits et moyens éleveurs de poulet, en particulier les femmes et les jeunes, les commerçants de poulet et les consommateurs de poulet, apportant ainsi une contribution significative à l'alimentation et la sécurité nutritionnelle et l'amélioration des moyens de subsistance des communautés rurales en particulier. Cette action sera mise en œuvre par l'Université Eduardo Mondlane (Mozambique), en collaboration avec l'Université de Gulu, l'Université de Makerere (Ouganda), le Réseau des femmes ougandaises (WOUGNET) et le Centre international d'aviculture rurale (Mozambique). Les partenaires associés sont l'Institut de recherche agricole du Mozambique (IIAM) et Chick Masters Limited (CML). Les partenaires apporteront leur expertise dans l'amélioration génétique du poulet, le contrôle des maladies, le développement d'aliments pour animaux, l'engagement des femmes/jeunes agriculteurs et exploiteront les capacités scientifiques et technologiques disponibles des réseaux des partenaires ; pour fournir un système de production de poulet innovant et durable. Dans cette action, nous allons : (1) Déterminer la composition génétique des écotypes indigènes de poulet au Mozambique et en Ouganda ; (2) Identifier les poulets indigènes avec des gènes permettant une croissance rapide et une production élevée d'œufs ; (3) Développer des poulets indigènes avec un poids corporel élevé, une forte production d'œufs, une couvaision et une survie réduites dans le cadre d'un système extensif au Mozambique et en Ouganda ; (4) Évaluer les régimes alimentaires basés sur la divagation des ressources alimentaires ; (5) Identifier et caractériser les causes de mortalité chez les poulets indigènes et (6) Évaluer l'efficacité de différents modèles de fourniture de technologies pour intensifier la production de poulets indigènes et croisés

Mots clés : Poulets indigènes, Sécurité alimentaire et nutritionnelle ; Autonomisation des femmes ; Amélioration génétique du poulet

Introduction

In Mozambique and Uganda, village poultry production is an important component of rural livelihoods and development. Most chickens are kept in small-scale extensive traditional systems in rural areas and supply meat and eggs that constitute almost the only source of animal protein and source of income for most rural families (U BOS, 2016; Mavale, 2001). Compared to other livestock species, chickens are fast-growing and prolific and produce meat and eggs over a short time-span. In Mozambique, two thirds of the territory is infested with tsetse fly, which limits cattle farming, hence poultry production is vital (Mata *et al.*, 2000). Native chickens face major challenges, namely: low productivity of meat and eggs, low genetic potential, difficulty in accessing productive assets such as feeds and vaccines, as well as inadequate marketing and distribution systems (Kayitesi, 2015). In addition, market access

and growth potential are constrained by low purchasing power of consumers, inadequate extension services, poor disease control, inadequate economies of scale and high transaction costs due to farmers being widespread.

Limited studies however exist on genetic improvement of native chickens (Mapiye *et al.*, 2008), with hardly any effort recorded in Mozambique and Uganda. Limited work on phenotypic characterisation shows that there are three native chicken phenotypes: normal feathers, naked neck and frizzled feathers in Mozambique (Matola & Mabunda, 2003) and Uganda (Kyarisiima *et al.*, 2004). Crossbreds have high adaptability to the free-range system and improved production under semi-intensive conditions (Islam & Jabbar, 2005; Huque *et al.*, 1999). This action seeks to improve performance of native chickens for body weight and egg production while maintaining adaptability to the free range system. This will be achieved through identifying and quantifying variation existing among the available ecotypes using phenotypic and genetic markers; and crossbreeding with a known elite line (Kuroiler). Use of genetic markers in screening elite chickens has been done in commercial poultry breeding in Korea (Sodhi *et al.*, 2013), India (Rahim *et al.*, 2017) and native chickens in Iran (Bahmanimehr, 2012).

Expected output/ Expected Results

1. Develop native chickens with high body weight, high egg production, broodiness and survival under extensive system in Mozambique and Uganda; that will be used to design successful and sustainable delivery models for scaling up native chicken production in Mozambique and Uganda: We will have established a team of national specialists in each country to work together on action-based research in order to achieve the following:
 - Genetic composition of selected native chicken ecotypes in Mozambique and Uganda determined.
 - Native chicken ecotypes with genes for fast growth and high egg production in Mozambique and Uganda identified
 - Native chickens with high body weight, high egg production, reduced broodiness and survival under extensive system developed in Mozambique and Uganda
 - Diets based on scavenging feed resources evaluated
 - Causes of mortality in native chickens identified and characterised: The teams will research causes of mortality in native chickens. They will also pilot surveillance of village chicken diseases and develop a disease database that will facilitate detection of trends of disease in future and provide a basis for focused research on native chicken diseases.
2. Effectiveness of different technology delivery models for scaling up native and crossbreed chickens in Mozambique and Uganda assessed. The action will evaluate three chicken technology delivery models for scaling up native and crossbreed chickens in Mozambique and Uganda, and validate at least one cost effective delivery model. At least 50 women and youth farmer groups, 20 mother units and 4 mini-hatcheries will be established in each region of each country. The behaviour and attitude of stakeholders in the chicken value chain will be documented and the number of native chicken characteristics preferred by farmers identified and documented.

This project will be implemented by a research consortium that brings together expertise in the sustainable production of improved native chickens (geneticists, poultry management experts, nutritionists, disease prevention and control personnel), in both Mozambique and Uganda, namely: Eduardo Mondlane University (Mozambique), in partnership with Gulu University and Makerere University (Uganda), together with WOUGNET, IRPC, IIAM and CML. The project partnership team, has competencies in business enterprise development and will seek technical support from Research and Education Agency (RAE) for engaging schools and students.

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