

# Department of Animal Science

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## CAN POULTRY PRODUCTION ADDRESS FOOD INSECURITY IN EAST AFRICA?

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Food insecurity is a significant threat to much of the world, particularly East Africa. Considering the predicted increase in human population in Africa, which is expected to double its current population of 1.2 to more than 2 billion by 2050, food insecurity concerns may worsen soon (Khalid Anser et al., 2019). Furthermore, the world's demand for animal-derived protein is expected to double in the same period, producing more threats of undernourishment in sub-Saharan Africa (SSA) (FAO, 2017). In addition, health and socioeconomic impacts of the COVID-19 pandemic will likely further deteriorate the nutritional status of the most vulnerable population groups in the future. Ironically, while we face food insecurity in much of the world, one-third of the food produced globally is either lost or wasted (World Bank, 2020). Addressing food loss and wastage is critical to improving food security, as well as addressing climate change issues and reducing the pressure and stress currently on the environment.

### Poultry production systems in Africa

Most rural smallholder farmsteads and an increasing number of commercial operations engage in poultry production in several regions of Africa, making poultry an integral source of protein, food security and revenue generation (Schneider et al, 2016). However, almost 25 percent of people in SSA were estimated to be undernourished in 2017, representing about one-third of the 821 million people suffering from chronic hunger globally (FAO et al., 2018). Two poultry production systems operate in most developing countries of Africa: (1) a labor-intensive commercial system with a high degree of specialized management and biosecurity, and (2) a more simple, subsistent, village poultry production system (Adene and Oguntade, 2006; FAO, 2006). Most food in SSA is produced by smallholder farmers even though this group is the most vulnerable to food insecurity and poverty. This makes smallholders a critical entry point for agriculturally-oriented interventions to improve human food security.

For the most part, smallholder farmers have two ways to obtain food: (1) growing food crops and/or livestock to consume the products themselves, or (2) selling these products and using the income to buy the food they consume. Determining whether production-based or income-based channels are more important for food security is a challenge. How market participation affects

food/nutrition security in isolated, rural communities, particularly regarding access to and consumption of diverse diets, is an important question that has not been answered.

### Indigenous vs. improved chickens

Importation of more productive chicken breeds has become an emerging trend across East Africa and is a major area of focus of numerous developmental projects as a tool for poverty reduction (Pius and Mbaga, 2018). Efforts such as the African Chicken Genetic Gain Project have tested and made available high-producing, smallholder farmer-preferred genotypes, both indigenous and imported, that are likely to increase smallholder chicken productivity in Africa. In Tanzania, for example, Kuroiler and Sasso breeds are now well-accepted by smallholder farmers because of their higher meat and egg production relative to indigenous breeds in the common scavenging production system (Pius et al., 2021).

The rapidly increasing demand for meat protein on a global scale is one of the greatest challenges facing food production systems today. In large part because, as people become wealthier, they consume more animal protein. For a variety of reasons (feed efficiency, time to market age, land required, etc.), the poultry sector has been the largest contributor to the growth of the animal industry in recent years. However, increases in poultry production may have adverse effects on the environment, such as climate change and increased risk of zoonotic diseases. Therefore, these possible effects should be considered as policies related to poultry sector expansion are developed across SSA (Daghir et al., 2021), particularly, policies impacting biosecurity and disease prevention and management.

Much of the global increase in poultry production in recent years has resulted from genetic improvements in commercial poultry breeding stock. However, maintaining genetic diversity is a critical factor in ensuring productivity and adaptability of livestock breeds, adapting to climate change and improving long-term food security throughout the world. It is well-documented that smallholder production systems in most tropical countries represent a unique (and often untapped) reservoir of genetic resources (Cao et al., 2021). Additionally, several indigenous chicken breeds have been reported to possess both superior levels of genetic variation relative to commercial breeds and unique phenotypic traits signifying valuable local adaptations (Pius et al., 2021). Many of these indigenous breeds are better adapted to harsh environmental climates, poor nutritional regimes and diseases compared to exotic breeds, thereby improving their resilience to the challenging and changing ecological terrains across Africa (Okpeku et al., 2019).

A major challenge is how to best design programs that take advantage of the improved genetics of exotic chickens while maintaining the unique and rich assortment of genetic resources found in indigenous chickens and use both to address food insecurity across East Africa. This is true in part because chicken producers face several challenges, not the least of which is access to a safe, affordable feed supply in terms of consistent protein, energy, vitamin and mineral sources (Ravindran, 2013). Feed costs are often up to 80 percent of a smallholder farmer's total production costs, leaving little room for resource-poor farmers to see a profit.

## Food security and poultry production

Food security is typically assessed over short time periods (daily, or perhaps weekly), whereas farm production and consumption of agricultural products are typically estimated on an annual or seasonal basis (Herrero et al, 2007). Annual time scales often used in agricultural surveys can be misleading because of the high variability of rural smallholder diets throughout the year. This diet variability throughout the year means that survey timing can significantly influence apparent consumption patterns in nutrition surveys. For example, smallholder diets in the period immediately after harvest are substantially different (often much improved) from those during the most difficult time of year, usually the period just before harvest (Fraval et al., 2019).

Considering how smallholder production affects the livelihoods of most of the rural population in many developing countries, understanding natural genetic variation in indigenous chicken breeds is important when addressing both human food security and genetic chicken improvement. Genetic chicken improvement projects should consider genetic variation of indigenous breeds before determining how best to match the competing needs of genetic improvement and genetic diversity in a way to adequately address food security. This is a major challenge and is not something most smallholders can accomplish on their own and highlights the importance and critical need for additional extension personnel to assist smallholder farmers.

Uyanga et al. (2021) indicated that accessibility to information communication technology (ICT) infrastructure (mobile phones, GIS, computers, internet, television and radio) may influence a smallholder's capacity to access extension services during difficult times, such as the COVID-19 pandemic. Although network reliability and data costs are challenges in rural areas, ICT would enable smallholders to get rapid updates and feedback from extension personnel and move farms towards more digital tools that could assist in marketing of products and provision of technical assistance from a distance. Such programs could promote digital agricultural extension to smallholder farmers and drive creation of localized extension videos using local farmers and native languages developed by subject matter specialists and extension personnel for use at the most appropriate time.

Food insecurity threatens much of the world population today, particularly in East Africa. The threat has been made worse by the ongoing COVID-19 pandemic. Poultry production may offer a solution to food insecurity in the region. However, for East African countries to feed their growing populations with less reliance on imports will require restructuring current poultry value chains. Smallholder farmers and larger, commercial producers would need to be integrated into stronger, upgraded value chains capable of boosting the contribution of the poultry sector to mainstream economies. Multiple challenges must be overcome including the increasing demand for meat protein, climate change, balancing improved poultry genetics with maintaining the rich genetic diversity of indigenous chickens and training additional extension personnel to assist smallholder farmers with best management practices. Nevertheless, East Africa has a vast amount of untapped potential to produce enough food for themselves and even a surplus for trade and export if the correct food production practices are put in place and managed correctly.

## References

- Adene, D. F., and A. E. Oguuntade. 2006. Poultry sector country review – Nigeria, 1-95. FAO Animal Production and Health Livestock Country Reviews. Rome.
- Cao, J., R. Baumung, P. Boettcher, B. Scherf, B. Besbes, and G. Leroy. 2021. Monitoring and progress in the implementation of the global plan of action on animal genetic resources. *Sustainability* 13(2): 775.
- Daghir, N., M. Diah-El-Harake, and S. Kharroubi. 2021. Poultry production and its effect on food security in the Middle Eastern and North African region. *J. Appl. Poult. Res.* 30:100110.
- FAO. 2006. Poultry review Ghana: The structure and importance of the commercial and village based poultry in Ghana. Rome.
- FAO. 2017. The future of food and agriculture – Trends and challenges. Rome.
- FAO, IFAD, UNICEF, WFP, and WHO. 2018. The state of food security and nutrition in the world. 2018. Building climate resilience for food security and nutrition. Technical report.
- Fraval, S., J. Hammond, J. R. Bogard, et al. 2019. Food access deficiencies in sub-Saharan Africa: Prevalence and implications for agricultural interventions. *Front. Sustain. Food Syst.* November 19.
- Herrero, M., P. K. Thornton, B. Power, et al. 2017. Farming and the geography of nutrient production for human use: a transdisciplinary analysis. *Lancet Planet. Health* 1:E33-E42.
- Khalid Answer, M., D. I. Godil, B. Aderounmu, et al. 2021. Social inclusion, innovation, and food security in West Africa. *Sustainability* 13, 2619.
- Okpeku, M., D. M. Ogah, and M. A. Adeleke. 2019. A review of challenges to genetic improvement of indigenous livestock for improved food production in Nigeria. *Afr. J. Food Agric. Nutr. Dev.* 19:13959-13978.
- Pius, L. O., and S. H. Mbagwa. 2018. Variations in village chicken management packages in two agro-ecological zones in Tanzania. *Int. J. Livest. Prod.* 9:42-49.
- Pius, L. O., P. Strausz, and S. Kusza. 2021. Overview of poultry management as a key factor for solving food and nutritional security with a special focus on chicken breeding in East African countries. *Biology* 10, 810.
- Ravindran, V. 2013. Poultry feed availability and nutrition in developing countries: Main ingredients used in poultry feed formulation. *Poult. Develop. Rev.* 2:694-695.
- Schneider, K., M. K. Gugerty, R. Plotnick, and C. L. Anderson. 2016. Poultry Market in West Africa: Overview and Comparative Analysis, pp 1-26. Evans School of Policy Analysis and Research (ESPR), University of Washington.
- Uyanga, V. A., O. M. Onagbesan, C. F. I. Onwuka, B. Emmanuel, and H. Lin. 2021. Coronavirus disease 2019 (COVID-19) and poultry production: Emerging issues in African countries. *World's Poult. Sci. J.* 77:153-174.
- World Bank. 2020. Agriculture and food. World Bank Group, Washington, DC, USA.



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