Improved Biosecurity and Extension Programming Can Benefit African Chicken Production

Chickens are the most common species of poultry raised around the world, with the total chicken population estimated at over 23 billion head (FAO, 2019). Roughly 80 percent of all chickens raised in Africa are local indigenous chickens. These chickens are well-adapted to harsh and stressful environments and are excellent scavengers (Msoffe et al., 2002). Unfortunately, viral infections are a serious threat to smallholder chicken production among poor, rural households in many developing countries across sub-Saharan Africa (Mpenda et al., 2019). However, improved biosecurity and better Extension programming can address many challenges and help protect indigenous chickens against viral diseases, such as Newcastle disease (ND), Marek's disease (MD), and infectious bursal disease (IBD), that cause enormous losses each year. Extension programming must emphasize isolation, sanitation, and traffic control.

Biosecurity Is Key

Biosecurity refers to all management practices aimed at excluding or reducing potential for transmission or spread of disease to animals, humans, or an area initially free from disease-causing agents (Msami, 2008). Three biosecurity principles are key in preventing the entry of disease into a flock or the spread of disease from infected premises (Nyaga, 2007):

- **Isolation** of premises and poultry from sources of infection. This includes such practices as keeping different bird species separated; preventing exposure of birds to potential sources of infection; preventing introduction of new birds into an established flock; quarantining new birds for 30 days before letting them join an established flock; quarantining a farm in the event of a disease outbreak; quarantining any birds that may have left the farm for a show or sale for 30 days before returning to the flock; sanitizing and decontaminating crates, coops, and any other items before returning them to the farm; preventing wild birds and animals or domestic pets from contacting flocks; identifying clean and dirty sides of the farming operation and always working from clean to dirty; identifying and separating clean and dirty sides of processing operations and preventing cross-contamination.
- **Controlling traffic flow** in and around susceptible areas to limit exposure. This includes fencing, gates, controlling human and vehicle movement within the farm and into the farm, and controlling equipment and product movement to and from the farm.
- **Sanitation** of equipment and housing, use of PPE (personal protective equipment) for poultry workers, and maintaining personal hygiene that will lead to the reduction or destruction of disease agents.

Overall, biosecurity measures are designed to ensure both exclusion and containment of infectious agents to prevent infecting clean flocks and spreading disease from infected premises. Unfortunately, **biosecurity measures across Africa are extremely lax** at the smallholder farmer level despite often being included in Extension programming packages (Mutua, 2018). Smallholder farmers may choose not to implement biosecurity recommendations because they don't understand the potential dangers to their flocks or because they believe the benefits of implementing biosecurity measures do not outweigh the costs (Moore et al., 2008).

Despite Extension efforts to disseminate intervention packages, smallholder farmers may selectively choose to adopt or refuse to adopt the packages, even though adoption is often **associated with higher productivity** (Justus et al., 2013). Management interventions are technologies used (or often not used) by indigenous chicken farmers to improve production and profitability of their poultry enterprise. These interventions include disease prevention and control measures, predator control, suitable feeding and watering systems, improved housing, genetic improvement, and good husbandry and biosecurity practices.

Ethnoveterinary practices are common in rural poultry production because of the almost complete absence or lack of assistance from Extension services and the ease and low cost of acquiring ethnoveterinary substances (Ekue et al., 2002). Ethnoveterinary medicine is the community-based,

local or indigenous knowledge and methods of caring for, healing, and managing livestock. It includes local folk beliefs, skills, methods, and practices pertaining to animal health care and production (Misra and Kumar, 2004). Such methods have very little success.

Constraints such as the large amount of land required for cattle production and the devastating effects of African swine fever on the global swine herd have made poultry the fastest-growing segment of global meat production, consumption, and trade. Developing-country economies contribute a large portion to the expansion. Despite the increasing demand for indigenous chicken products by local consumers, their low productivity and availability (resulting from high disease incidences, inadequate nutrition, low genetic potential, and poor marketing channels) lessen their contribution to rural development (Mwobobia et al., 2015). Improved biosecurity and better control of common diseases in free-range/scavenging production systems could **improve chick survival rate by at least 30 percent**, while improved feeding, housing, and disease control could improve survival rate to 80 percent (Odwasy et al., 2006).

Smallholder farmers currently use inputs with little or minimal external sources (Mutua, 2018). These include poor quality feed resources, local chicken breeds (sometimes crossed with improved breeds from neighboring farmers), minimal or no veterinary services, and traditional housing systems (Aila et al., 2012). Indigenous chickens are often produced by smallholder farmers with **little or no biosecurity measures in place**; unconfined birds scavenge near the homestead and often interact with wild birds and other livestock in the process (Aila et al., 2012). Unfortunately, **biosecurity remains weak** across much of sub-Saharan Africa even though studies indicate that biosecurity practices can reduce pathogens to non-infective levels (Mutua, 2018).

Challenges

Traditional indigenous poultry husbandry in sub-Saharan Africa has the following characteristics:

- Birds range freely during the day and usually return to the homestead in the evening.
- Feed is often limited to what the birds can find on their own (insects, seeds, kitchen wastes).
- Productivity is low.
- Mortality rates are high.

Most **smallholder farmer production systems receive limited support from Extension programs**, credit organizations, veterinary services, training opportunities, or marketing assistance.

The major challenges facing indigenous chicken production are diseases, parasites, predators, inadequate feeds, and lack of adequate chicken housing and husbandry skills (Mutua, 2018). **Newcastle disease is the main disease threat**, followed closely by IBD, fowl pox, coccidiosis, respiratory disease, and Marek's disease. In addition, 50–75 percent of smallholder farmers have never received Extension training on basic poultry husbandry practices (Mutua, 2018).

A **fledgling commercial poultry industry** in some African countries also faces challenges such as high-priced feed ingredients (corn and soy), **inadequate Extension support** for developing farms, and lack of infrastructure such as roads capable of handling heavy feed and live-haul trucks (Oosthuysen, 2013). Other challenges include expensive vaccine and veterinary services, poor management of sick birds, and few restaurants and hotels to create a steady demand for product (Butler, 2016). Many of the challenges that smallholders face plague the commercial industry, as well, including inadequate husbandry skills, lack of farmer training systems, lack of information on cost-effective chicken and egg production at the producer level, and inadequate technical assistance (Mapiye et al., 2008).

Unfortunately, the potential of indigenous chickens to contribute to household incomes and poverty alleviation across much of sub-Saharan Africa is constrained by slow-maturity and low-productivity genetics (Kamau et al., 2019). To address these constraints, improved indigenous chicken (IIC) technologies have been developed and introduced to smallholder farmers in targeted areas. However, **IIC technologies have not been well adopted**. Head-of-household gender, farm size, social group membership, distance to training centers, off-farm activities, and IIC awareness significantly affect the decision to adopt improved indigenous chickens (Kamau et al., 2019). On the other hand, household head education, household size, farm size, source of information on IIC, and increased awareness of IIC (a measure of programming success) has significant effects on level of adoption. Extension, as a channel of information, appears to be effective, although Extension policy should enhance current measures (Kamau et al., 2019).

Extension Programming

Extension efforts should expand programming by incorporating additional approaches to reach more individuals, particularly women, who are often the caretakers of the chickens (Kamau et al., 2019). Extension programs are sometimes provided by a variety of individuals, including government workers, private

professionals, community-based service providers, faith-based organizations, and non-governmental organizations (Mutua, 2018). Smallholder farmers receive most of their agricultural information from radio and television programs, field days, agricultural shows, barazas (places where public meetings are held), and, occasionally, farm site visits.

However, delivery of **Extension programming on chicken management is often hindered** because the solutions offered by Extension personnel often do not match the challenges faced by smallholder farmers; indigenous chickens are not valued highly; and smallholder farmers have low literacy levels (Mutua, 2018). Other challenges to Extension-delivered programming include language of delivery not matching that of the clients, costly printed Extension materials, and trainings where the audience in attendance (mostly men) does not match the daily caretakers of indigenous chickens (mostly women). **Extension efforts should mainly target women** through training on the importance and application of management interventions (Justus et al., 2013). Adoption of management interventions could be improved in rural areas through increased access to Extension messages that consider farmers' economic situation and the technical skills required for disease control, housing and equipment management, and marketing initiatives. In other words, **Extension's message should match the abilities of the clients**.

Clearly, Extension needs to play a more valuable role in addressing challenges that hinder delivery and adoption of programming. Perhaps most vital is to **increase the number and quality of government Extension officers.** Individuals should have proper training and skills to address challenges faced by smallholder farmers, particularly in the areas of biosecurity; recognition, management, and prevention of disease; and general poultry husbandry. Extension should also train additional **community service providers** who can work one-on-one with smallholder farmers at the local village level. **Train-the-trainer programs** where Extension officers selectively train village champions to go back and disseminate information to smallholder farmers in their own villages, in their own languages, and at their own pace will improve efficiency and coverage area of Extension poultry programming, particularly if some of those trainers are women.

Extension should focus on expanding poultry programming across sub-Saharan Africa. Additional programming areas should focus on these areas:

- marketing
- securing finances to expand an operation
- improving genetic breeding stock
- creating affordable printed poultry Extension materials in the local language
- using farmer-to-farmer field schools
- constructing regional model chicken houses to serve as patterns for smallholder farmers

Extension programming **must address the specific needs of smallholder farmers**. Programming that does not offer a better life for Extension's clients undermines Extension's overall purpose.

Summary

Chickens are raised by most poor, rural households across sub-Saharan Africa as a source of high-quality protein and for income generation. However, biosecurity measures to protect indigenous chickens are not well adopted at the smallholder level. Efforts should focus on **improving biosecurity at the smallholder level** to protect indigenous chicken populations.

In addition, Extension should **recruit and train additional Extension officers**. These officers should disseminate information on basic poultry husbandry practices, biosecurity at the farm level, and disease prevention and management (including proper vaccination programs). Train-the-trainer programs could teach village leaders and community service providers to train smallholder farmers on poultry best management practices. Better biosecurity and improved Extension programming can benefit food security and income for many smallholder farmers and their families across sub-Saharan Africa.

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