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SCALING UP OF IMPROVED POULTRY BREEDS IN UGANDA

REVIEW OF SUCCESSFUL SCALING OF AGRICULTURAL TECHNOLOGIES

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E3 Analytics and Evaluation Project

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ACRONYMS

ADS	Anglican Development Service
ASU	Arizona State University
BMGF	Bill and Melinda Gates Foundation
CBO	Community-Based Organization
CRS	Catholic Relief Services
DOC	Day-Old Chick
DPO	District Production Officer
DVO	District Veterinary Officer
FAO	Food and Agricultural Organization of the United Nations
FGD	Focus Group Discussion
FTF	Feed the Future
GDP	Gross Domestic Product
GOU	Government of Uganda
KCCA	Kampala City Council Authority
KII	Key Informant Interviews
MAAIF	Ministry of Agriculture, Agricultural Industries, and Fisheries
MDGs	Millennium Development Goals
MPED	Ministry of Finance, Planning, and Economic Development
MSI	Management Systems International
MU	Mother Unit
NAADS	National Agricultural Advisory Services
NAGRC-DB	National Animal Genetics Research Center & Database
ODA	Official Development Assistance
PMA	Plan for Modernization of Agriculture
QDSS	Quantitative Data from Secondary Sources
SPRING	Strengthening Partnerships, Results, and Innovations in Nutrition Globally
TOC	Three-Week-Old Chick
TPO Uganda	Transcultural Psychosocial Organization
UBOS	Uganda Bureau of Statistics
UGX	Ugandan Shillings
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

This report provides summary findings and conclusions from the scaling-up of Kuroiler chickens through commercial pathways in Uganda from 2009 to the present. It is part of a series of studies looking at successful scaling-up of agricultural innovations in developing countries. The United States Agency for International Development's Bureau for Food Security commissioned the E3 Analytics and Evaluation Project to conduct these studies as part of its efforts to scale up the impact of the Feed the Future (FTF) food security initiative. The goal of these studies is to produce lessons learned and, ultimately, guidance for USAID and its country Missions interested in integrating a commercial pathways approach to scaling-up into their FTF project designs, procurements, and implementation. This overall research is designed to provide a better understanding of the types of innovations and country contexts that are best suited to scaling-up through commercial pathways, and what activities, strategies, and support are necessary to facilitate that successfully.

Background

Taking the commercial and backyard flocks together, there are an estimated 44 million chickens in Uganda,¹ or a little more than one per person. Demand for poultry products is growing as a consequence of urbanization and income growth. While commercial and semi-commercial poultry production is increasing, the vast majority of chickens are still owned by small farmers, usually with women primarily responsible for their care. They serve to provide both a food source for farmers and a supplementary source of income. The Kuroiler chicken breed was developed by Keggfarms in India, where they have successfully scaled its distribution to millions of families. In 2009, at the request of the Government of Uganda, Kuroilers were first introduced to Uganda in a breed-testing pilot project conducted by Arizona State University (ASU) and the Uganda National Animal Genetic Resources Center (NAGRC). A goal of the Bill and Melinda Gates Foundation (BMGF) is to use their poultry development program to improve the incomes, nutritional outcomes, and food security for smallholder farmers. Following the success of that pilot, the BMGF – at the request and with the cooperation of ASU and the Government of Uganda – decided to provide USD \$1.2 million to support the introduction and further distribution of Kuroiler chickens in Uganda. This support came in the context of a much wider poultry program in East and West Africa, but was not a major component of that program.

Characteristics of the Innovation

Kuroiler chickens are a hybrid, dual-purpose (meat and eggs) breed developed in India by Keggfarms from internationally certified breeds. They have several advantages over existing indigenous varieties in South Asia and sub-Saharan Africa: 1) their speedy growth to marketable size for meat, 2) prodigious egg production, 3) no significant difference in (and perhaps even an improved) taste, and 4) ability to thrive as scavenger birds. They require little supplementary feeding for basic survival but need supplementary feed to thrive. The review team found that Kuroilers were attractive to farmers because of their: 1) rapid growth to marketable size for meat and high levels of egg production; 2) ability to survive by scavenging; and 3) generally high survival rate, assuming proper vaccination. There is a strong business case for Kuroilers in principle and strong potential demand for Kuroiler meat, in particular from increased consumption due to urbanization and economic growth. Moreover, Uganda is a significant net poultry meat importer.

On the downside, Kuroilers are an F1 hybrid breed; they cannot reproduce through breeding and lack the gene for brooding because of the loss of hybrid vigor and other traits at F2 and subsequent

¹ Uganda Bureau of Statistics.

generations. Subsequent Kuroiler generations (F2, F3, F_N) eventually lose all of their advantageous characteristics. Kuroiler flocks require replacement every 18 months to 2 years, requiring regular capital reinvestment. Though Kuroilers are hardy, they require strict adherence to a vaccination and phytosanitary protocol and more management skills and monitoring than traditional Ugandan chickens do. Many farmers who traditionally have small flocks lack these skills — especially women, given competing demands on their time. Compounding these issues is the fact that Kuroilers are easily counterfeited. The review team observed a number of cases of substantial losses, high mortality through disease, and consequent discouragement among small farmers. (The same problems were present and remain in vaccination and feed as well).

The Scaling Strategy

The scaling strategy for Kuroilers was rudimentary, based on a successful pilot conducted by ASU researchers. Drawing on the results of the pilot, a plan to scale up revolved around increasing supply and high-level marketing to farmers. Based on this plan, the Kuroiler project received financing from the BMGF for generating supply from the National Animal Genetic Resource Center and Database (NAGRC), the national animal research institution that also was largely responsible for publicity. Workshops and awareness campaigns formed part of the scaling strategy that was initially based on a single, public-sector supplier. The “strategy” did not include market studies, feasibility studies, plans to identify (let alone strengthen) any gaps in the value chain, or training and extension support to adopters. The funding did not provide for ongoing monitoring to adjust strategy and tactics in real time. There was no private partner in the first phase of the project and NAGRC and ASU, as primarily research institutions, lacked commercialization experience. They did not involve experts with that kind of experience to inform the scaling strategy or its implementation.

The scaling strategy should have also considered the genetic erosion of local birds, which farmers depended on for subsistence, selecting and breeding over generations to produce a local chicken with many superior adaptive and quality traits. At the outset of the project, a pertinent Ugandan body should have considered ways to conserve the local chicken genetic diversity. This would have ensured that small-scale farmers could resort to their local chickens if the scaling-up of Kuroilers failed.

Public sector support for the introduction of Kuroilers has been extensive in terms of promotion and the initial provision of facilities at NAGRC and the involvement of local extension agents in awareness-raising. However, local officials often had inadequate training and field agents did not appear to have had the necessary education and training; e.g., some had unknowingly, in their own farming activities, bred fake Kuroilers.

NAGRC and ASU were successful in creating an explosion of demand, based perhaps on a misunderstanding of the challenges associated with raising Kuroilers, that revealed supply shortages and other weaknesses in the value chain. NAGRC could not keep up with demand, and as no effective regulatory system existed to combat counterfeit Kuroilers, vaccines, and feed, the gap in supply was often filled by counterfeits. Farmers who were able to obtain Kuroilers were frequently disappointed, often unaware of the special care that Kuroilers need and the fowls’ propensity to experience high mortality. Farmers had difficulty accessing valid vaccines and veterinary services. Their efforts to sell the birds’ large production of eggs in local markets led those markets to quickly become saturated, despite the potential demand in secondary/urban markets. Linkages from local to urban markets were weak and unaddressed.

To date, only efforts to address the supply issue have been initiated. This has taken the form of adding a private sector breeder — Chick Masters Ltd. — and mother units (MUs) to raise chicks to three weeks old. Even so, NAGRC and Chick Masters cannot keep up with demand, and MUs have not been formed

in sufficient or constant quantities; many have closed down or operate only sporadically. As a result, demand is being met in large part by counterfeit birds that, at three weeks old, are indistinguishable from Kuroilers and, indeed, are derived from local breeds that the Kuroiler strongly resembles. The output of surviving birds from NAGRC and Chick Masters is some two million Kuroilers annually.

Conclusions

- Kuroilers could have a significant positive impact on the income, nutrition, and food security of rural families and could help empower women, if certain conditions are met;
- They afford an opportunity for good, sustainable profits for commercial poultry operations;
- Opportunities for profitable MUs are available; and
- With proper care, feeding, and fencing, Kuroilers can thrive in a simple, rural environment if farmers have time and the management and marketing skills and access to real Kuroilers, vaccines, and feed.

The Kuroiler project rests on sound research and a good product that has been proven to work and lift people out of poverty in India, increasing women's empowerment along the way. However, its introduction to Uganda was not preceded by sufficient research into the nature of the market, the nation's range of agro-ecologies, ways to ensure proper training for farmers, the extent of modification to existing practices, or the weaknesses in the value chain to underpin successful Kuroiler farming. Moreover, the absence of follow-up strategies once the project was operating have precluded analysis of its impact on rural livelihoods and, therefore, any recalibration of methods, apart from shifting production from the public to the private sector.

Lessons for Donors

This case study has shown that donors need to assess their support for projects fully before embarking on them. In particular:

- Funding — in this case about USD 1 per bird to date over four years (2012–2016) — needs to include not only supply and marketing, but also strengthening the value chain and a broader set of commercialization activities.
- The decision regarding whether or not to scale up an innovation needs to account for the degree of change involved relative to adopters' (farmers') existing practices. The same is true relative to whether additional demands exist on household time, labor, and budgets, and whether households can meet those demands. If scaling proceeds with significant changes in practices and time demands, the scaling strategy and allocation of resources need to address these proactively.
- Where new breeds require significant changes in skills and greater integration into markets, farmers need to receive poultry raising and livestock marketing skills, at least until a critical mass is reached.
- Commercial scaling strategies need to be based on market research, feasibility, and usability analysis, including the absorptive capacity for the product, price levels, fluctuations in demand, competition, and marketing mechanisms.
- The capacity of the upstream value chain needs to be assessed in terms of its ability to produce and distribute needed inputs (e.g., quality feed supplies) and complementary services (e.g., veterinary supplies and services) accessibly and affordably. The same is true in terms of downstream linkages to markets, processors, or both. The scaling-up strategy needs to address any weaknesses or gaps in the value chain in ways that are financially/fiscally and organizationally sustainable, whether through public, private, or non-profit sectors.

- For innovations where quality and certification of authenticity are important, local regulatory and enforcement infrastructures need to be examined to ensure that quality and counterfeiting can be addressed.
- The organizations driving and implementing scaling need to have the capacity and resources, broadly defined, to make commercial assessments about the context and requirements for scaling, then translate them into a scaling strategy and implement it. This generally implies the inclusion of private-sector partners along the value chain from the very beginning.
- Continuous collaborative monitoring of the progress of the project is essential and should lead to adaptive management as the project progresses. Monitoring in terms of accountability to donors, the public sector, and other stakeholders needs to be complemented by market-based indicators. These could include: the nature of early adopters, their motivation for adopting, and their location; the profitability of farmers, as well as upstream and downstream value chain actors, and the variance of profitability/successful adoption demographically and geographically; repeat purchases by early adopters; and difficulties facing farmers and value chain actors in successful adoption.

I. INTRODUCTION

A. Report Background and Context

The United States Agency for International Development's Bureau for Food Security (USAID/BFS) and the Agency's country Missions have been implementing the Feed the Future (FTF) food security initiative for five years. In many cases, innovations developed and introduced at a small level have since gone to scale or are in the process of scaling. At the same time, some innovations that potentially could have gone to scale apparently have not done so, have not reached their full-scale potential, or are not fully sustainable at scale.

Many reasons explain this unfulfilled potential, such as a substantial focus on achieving the immediate outcomes and objectives defined in an activity solicitation and award/agreement with an implementing partner. Substantial anecdotal evidence shows that one reason for this unfulfilled potential is that the use of commercial pathways for scaling is often not well understood or is incompletely integrated into activity designs, procurements, and implementation plans. In other words, it appears that USAID/BFS and Missions could do more in both scaling and sustainability by using commercial pathways.

In this context, USAID/BFS has commissioned the E3 Analytics and Evaluation Project² to conduct and synthesize five case studies to understand better how commercial pathways have been successfully used in the scaling and sustainability of agricultural innovations in developing countries. The goal of this overall study is to produce lessons learned and ultimately guidance to offer to USAID/BFS and Missions interested in integrating this scaling-up approach into activity designs, procurements, and implementation. A particularly important goal is to develop a methodology that will allow USAID and its implementing partners to: (a) estimate the speed and level of adoption by farmers; (b) identify the time and resources required to create the institutional foundations and enabling environment that would allow for a transition to commercially driven and/or spontaneous scaling-up and diffusion; (c) identify critical levels of initial adoption that would allow for such a transition; and (d) provide for general benchmarks to monitor progress and success in creating the foundations for and a transition to commercially driven and/or spontaneous adoption and scaling.

This overall study is designed to address five research questions:

1. Are there models using commercial innovation and growth mechanisms for bringing new agricultural technologies to scale in FTF countries?
2. What are the essential characteristics of innovations, value chains, and other spaces for identifying where commercial innovation growth and diffusion models are appropriate for reaching potential scale?
3. What determines the shape of the S-curve (e.g., size of critical mass of adopters, speed and timing of technology adoption and diffusion, peak levels of scale reached), and how can these factors be estimated?
4. What types of activities are appropriate to implementing or facilitating a commercial scaling pathway? Examples may include strengthening value chains and distribution mechanisms, using media and other communication forms, and leveraging and strengthening social networks and channels.

² The E3 Analytics and Evaluation Project is implemented by team lead by Management Systems International, in partnership with Development and Training Services and NORC at the University of Chicago.

5. What are the implications of achieving scale and sustainability using commercial scaling pathways for USAID's project designs, procurement mechanisms, planning, budgeting, cost/benefit analysis, and monitoring and evaluation of FTF programs?

B. Report Purpose

This report examines the introduction and scaling of Kuroiler chickens in Uganda. The breed was initially introduced in 2009 through a pilot conducted by a research team from Arizona State University (ASU) and the Ugandan Ministry of Agriculture Animal Industry and Fisheries (MAAIF). Following the success of the pilot, subsequent scaling was supported by grants from the Bill and Melinda Gates Foundation (BMGF). Scaling-up of Kuroilers began in 2013.

BMGF is providing support to local private-sector partners to scale the integrated delivery of more productive dual-purpose low-input chicken breeds together with quality feed, all necessary poultry vaccines, and technical veterinary and extension support. BMGF considered its involvement in the Uganda Kuroiler project to be a pilot from which lessons could be drawn to inform the foundation's wider poultry and poverty-reduction activities elsewhere in Africa. ASU was the driver behind the project and funding was channeled through the university. This was in contrast to Ethiopia, for example, where BMGF directly partnered with Ethiochicken, a private poultry enterprise with a similar mission to that of the Kuroiler project in Uganda but which had multiplied production by over 30 times in one year. BMGF funded Ethiochicken with approximately USD \$7 million and saw production reach nearly 10 million day-old chicks per year. The Ethiopian poultry program is viable, profitable, and has a long-term, self-sustaining future. BMGF has had similar experiences in Tanzania and in Nigeria through partnerships and associations with both public authorities and private institutions such as the World Poultry Foundation, Silverlands (Makota Farms, Iringa, Tanzania) and Amo Farms Sieberer Hatcheries in Nigeria.

The introduction of Kuroilers was always intended to be a commercial operation and external grant funding was time-limited from the beginning. Private partners were expected to become autonomous following an initial period of support. This is the only one of five case studies about scaling up agricultural technologies in developing countries that did not include any official development assistance (ODA). It is also the only case covering the introduction of a new breed of livestock with higher production potential.

The methodology for this final case study in the series is based on that developed and refined for the first study, *Scaling-Up of Drought-Tolerant Maize in Zambia: A Review of Successful Scaling of Agricultural Technologies*,³ which has been revised in light of lessons from subsequent experience. In piloting the case-study methodology, a topic of particular interest was how to collect sufficient data to estimate an S-curve of adoption over time, geography, and demographics that would allow USAID Missions that are designing and implementing FTF programs to create benchmarks for progress in scaling, even where early numbers are small relative to the ultimate potential market. However, the case of Kuroiler chickens in Uganda does not lend itself to this type of analysis, due to the fact that first adopters were beneficiaries of a pilot study, after which this particular innovation — a new breed of poultry — was unavailable for three years, a significant period of time. A hiatus between the initial introduction and subsequent scaling efforts may have compromised the program's success in scaling.

³ Available from: <https://agrilinks.org/sites/default/files/resource/files/BFS%20Scaling%20Review%20-%20Zambia%20Report%20REVISED%202-8-16.pdf>

C. Methodology Used

The review team developed an approach for conducting these case studies that is grounded in the spaces, drivers, and pathways analytical framework developed by Hartmann and Linn⁴ and the scaling-up framework authored by Cooley and Kohl of Management Systems International (MSI).⁵ The term “space” is multidimensional and encompasses the fiscal/financial, political, policy (legal and regulatory), organizational, socio-cultural, agro-ecological, partnership,⁶ and learning components that could affect scaling. “Drivers” are factors or actors that move an innovation from pilot toward scale, including the individuals or organizations that lead the scaling-up effort and their motivation and incentives, as well as how these interact with the characteristics of the innovation itself and the spaces or context. “Pathways” are the sectors used to take the innovation to scale: the private and public sectors, donors, and other third parties or some combination thereof. This study assesses the respective roles played by each sector, with a special emphasis on the role of the private sector (i.e. the commercial pathway) as that is the primary focus of this research.

The review team developed key components based on the analytical frameworks that will be used to examine the scaling-up of the innovation. The review team examined the following components within this framework in terms of their role in scaling up the innovation:

- **Characteristics of the innovation:** the package of components needed to be adopted; knowledge and physical input requirements for effective adoption and implementation; cost, complexity, and sophistication required; changes needed, if any, in farmers’ existing agricultural practices; and the relationship to adoption of other innovations, whether complementary, substitutes, or pre-requisites.
- **Adoption drivers and results over time and space:** the reasons for adoption; variation in the degree of adoption and other patterns; socio-economic and demographic characteristics; and the role of different information sources in affecting adoption.
- **Business case for the innovation:** the costs, risks, and returns of adopting, producing, marketing, and distributing the innovation (or innovation package) relative to the motivations and incentives of potential adopters and other private actors in the value chain.
- **Potential scale of adoption (the market space).** The potential market for Kuroilers consisted of those who adopted them to supplement their own consumption and to produce a small surplus of eggs and meat for sale, as well as those whose primary objective was commercial sales. The review team’s estimates for the potential market included all three categories of farmers who do or could raise poultry. The criteria used were: their specific agro-ecological and physical conditions; the profitability of raising chickens; the implications of full-scale adoption for the national-level supply of poultry and eggs; and the ability of the market (growing demand) to absorb these sales without adversely affecting poultry prices, which could be beneficial for consumers but detrimental to poor producers.
- **The external context or spaces.** In the case of Kuroiler chickens in Uganda, a review of the initial data collected narrowed the relevant spaces to: the policy-enabling environment; the supply chain; gender; the downstream market; the financial resources of farmers; the transportation space (distance to markets and input suppliers); and the organizational capacity of

⁴ Hartmann, A. and J. Linn (2008), *Scaling Up: A Framework and Lessons for Development from Literature and Practice*, available at https://www.brookings.edu/wp-content/uploads/2016/06/10_scaling_up_aid_linn.pdf.

⁵ Cooley, L. and R. Kohl (2006), *Scaling Up: From Vision to Large-Scale Change*, MSI, Washington, D.C., available at: <http://www.msiworldwide.com/files/scalingup-framework.pdf>.

⁶ The partnership space looks at the potential organizations whose sponsorship and resources can be enlisted by the lead or driving organizations to support scaling-up.

the private sector. Of particular interest is the role of partnerships in scaling-up, especially where a spread of expertise is required. In the case of Kuroilers in Uganda, the partners included the state, through the National Animal Genetic Resource Center and Database (NAGRC),⁷ ASU, and the BMGF, with the addition in Phase II of the private sector partner Chick Masters Ltd. Hence, part of the analysis here is intended to clarify the roles of each and assess their impacts. The review team also examined the spaces of gender, as well as organizational capacity in other sectors, but concluded that they were not relevant to scaling-up, which is the focus in this case and therefore those spaces are not discussed in this context.⁸ However, the predominant role played by women in poultry production means that any changes to the industry disproportionately impact women either positively or negatively. Some of these effects, while not the central issue of the report, are discussed in subsequent sections.

- **Scaling-up strategy, activities, and results.** An alliance of the partners managed the overall strategy for introducing and scaling up, with the initial promotion through broadcasts and workshops financed by BMGF and carried out by ASU with NAGRC and local officials. The principal downstream support for scaling was provided by community-based organizations (CBOs), international non-governmental organizations (NGOs), and other parts of the public sector, including district veterinary and production officers (DVOs and DPOs). The review team narrowed its focus to activities to:
 - Introduce farmers to the innovation and persuade them to adopt it;
 - Address gaps or otherwise strengthen the market system and external context that facilitated scaling up, even if that was not their intended purpose; and
 - Persuade various actors and stakeholders to drive or support the scaling up process, e.g. subsidies and other risk mitigation efforts.
- **Lessons for donors and others interested in scaling up agricultural innovations.**

The methodology for this case study involved four data collection techniques: document reviews (DRs), key informant interviews (KIIs), group discussions (GDs), and analysis of quantitative data from secondary sources (QDSS). These approaches were used to collect qualitative and quantitative data from a large number of diverse stakeholders associated with the Kuroiler value chain and the distribution and use of Kuroiler chickens in Uganda. Table I summarizes the sources and key spaces and drivers for the data collected. Each cell notes whether relevant data was provided for a particular topic, ranked on a scale of 1 (X – least important) to 4 (XXXX – most important) regarding the utility of the information gathered.

⁷ The formal acronym is “NAGRC-DB,” but for reasons of brevity, this report uses “NAGRC” throughout to denote the National Animal Genetic Resource Center and Database.

⁸ The other sectors include the public sector, industry, and services. While some services — essentially power and water — do impact the Kuroiler program, their influence was not examined in depth, since no interviewees considered them to be important.

TABLE 1: DATA COLLECTION OVERVIEW

Data Source	Data Collection Methodology	Data Collected					
		Innovation Characteristic	Adoption Drivers and Results	Business Case	External Context	Scaling Strategy & Activities	Potential Scale & Output Markets
Poultry Farmers	KIIs and GDs	XXXX	XXXX	XXX	XXX	XX	X
Kuroiler Producers	KIIs and DR	XXXX	XXXX	XXXX	XXX	XXXX	XX
Retailers (“mother units”)	KIIs	XXX	XXX	XXXX	XX	XX	XXX
Innovators – essentially Keggfarms	KIIs, DR	XXXX	X	XXX	X	XXX	XXX
Ministry of Agriculture	KIIs, DR, and QDSS	XXX	XXX	X	XXXX	XXXX	XXX
Uganda Bureau of Statistics	QDSS, DR				XX		XXXX
Field Extension Officers	KII	XXXX	XXXX	X	XXX	XXX	XX
NGOs working in Agriculture	KII, GDs	XXXX	XXXX	XXX	XX	XX	XXX
USAID and other Donors	KII, DR	X	X	X	XXX	X	XX
National Farmers Associations	KII, DR,	X	XX	XXXX	XXXX	XXX	XXX
Agricultural Policing Commission	KII	X		XX	XXXX		X

Data collection took place in Kampala City and District, Wakiso (including Entebbe), Mayuge, Mukono, Jinja, Kabale (by phone), Kiryandongo, Apac, Lira, and Gulu. Preliminary interviews with MAAIF officials, representatives of the Kampala City Council Authority (KCCA), and artisanal (uncertified) “Kuroiler” producers, as well as the production and marketing team from NAGRC, took place in Kampala and Entebbe to establish the basis for interviews with intermediaries and end-users in the countryside. The review team spent 10 working days conducting KIIs and GDs with diverse stakeholders in rural areas (see Annex I), including farmers, retailers, county field extension officers, and representatives of the private producers (e.g., Chick Masters).

The team interviewed more than 70 stakeholders in Kampala, Entebbe, and the rural areas combined, including: 7 NGOs and CBOs, 17 officials, 33 individual small farmers, 7 farmers’ groups, 13 commercial farmers and 2 mother units (MUs)⁹ Two briefings were held with members of the USAID Mission in Kampala for an exchange of information, although USAID was not a partner in the Kuroiler project in Uganda.

The review team supported its research with documentation from the Ugandan MAAIF, Keggfarms, ASU, BMGF, and scholarly articles from a variety of sources.

The transparency of the partners in supplying information for this review cannot be understated. Their honesty and integrity were vital in ensuring a complete understanding of the implementation of the Kuroiler project in Uganda, its potential, and the shortcomings that have so far resulted in sub-optimal performance. This kind of cooperation is all too rare in such an analytical exercise, but is essential if donors and the development community are to be able to learn from mistakes and successes, working

⁹ See Annex I for details of principal interviewees.

toward more of the latter and minimizing occurrences of the former. The cooperation that the review team received from the partners sets the standard for cooperation in future studies of this kind.

Information on the contribution of Kuroiler chickens to food security in Uganda came from the central statistical office, the Ministry of Agriculture, research papers, and other publicly available data sources. Local county offices provided data on local production, targets, and consumption. Chick Masters provided detailed production reports and forecasts, and local agricultural goods suppliers provided sales figures for Kuroiler chickens.

D. Report Structure

Section II of this report provides some background information on the place of agriculture in the Ugandan economy and on poultry production. Section III describes the characteristics of Kuroiler chickens and how they were expected to contribute to poverty reduction and improved livelihoods in Uganda. It assesses the characteristics of the innovation that facilitated or impeded its adoption and promotion at scale, on the basis of a commercialization strategy that evolved from a donor-supported initiative to include private, public, and NGO actors. Section IV outlines the business case for the innovation, including how each actor on the value chain participates in the distribution of profits. Section V examines the external context or spaces, looking at the pre-existing production and distribution system for poultry chicks, markets for chicks, the organizational capacity of key actors in the sector, and the role of gender. It highlights some of the outstanding challenges in establishing a sustainable value chain supporting scaling of the innovation. Section VI describes the original scaling strategy and activities, who implemented them, and how the strategy and activities evolved over time. It looks at both what was done to identify the right package of innovations bundled with Kuroilers and what was done to increase awareness and promote adoption, to ensure an adequate supply of chicks, and to address other areas of the value chain. Section VII contains the overall conclusions from the Kuroiler experience in terms of the selection of the innovation package, marketing, and strengthening of the value chain. Section VIII offers some preliminary recommendations for donors on how to translate these conclusions into actual practice in designing, contracting, and implementing the scaling-up of agricultural innovations in the hope that the Kuroiler experience may inform their future decision-making and practices.

E. Team Composition

The in-country review team consisted of Colm Foy of MSI, an established expert who has worked in African development for over 40 years, and Andrew Emmanuel Kezala of Development and Training Services, a Ugandan national with extensive experience in East African agriculture. Richard Kohl and Gwynne Zodrow from MSI supported the team.

II. BACKGROUND OF AGRICULTURE IN UGANDA

A. Profile of Uganda

Uganda has a total area of 241,550.7 km², of which 41,027.4 consists of open water and swamps, leaving 200,523.2 km² of land, 34.4 percent of which is arable¹⁰. The altitude ranges from 620 meters above sea level (Albert Nile) to 5,111 meters (Mt. Rwenzori peak). Uganda shares Lake Victoria with Kenya and Tanzania and Lakes Albert and Edward with the Democratic Republic of Congo (DRC). The population

¹⁰ <http://data.worldbank.org/indicator/AG.LND.ARBL.ZS>, last visited October 19, 2016. Data from 2013.

was 34.9 million in 2014.¹¹ Between 2002 and 2014, the average annual population growth rate was 3 percent and the population continues to become younger and more urban. The system of government is based on districts, which encompass local governments and administrative councils. The central government is responsible for national affairs and services; formulation of national policies and national standards; and monitoring the implementation of national policies and services to ensure compliance with standards and regulations. Line ministries carry out technical supervision, technical advice, mentoring of local governments, and liaisons with international agencies.

B. Agriculture in Uganda

Over 85 percent of Ugandans live in rural areas. The agricultural sector presents a great opportunity for poverty reduction, since it employs more than 80 percent of the labor force.¹² The agricultural gross domestic product (GDP) in 2014 consisted of cash crops, 7 percent; livestock and forestry, 36 percent; and fisheries, 7 percent; but the bulk of agricultural GDP (50 percent) comes from food crops.¹³ Despite the fact that agriculture accounts for most of rural livelihoods, the overall share of agriculture in GDP declined from 50 percent in the early 1990s to 24.6 percent in 2014.¹⁴ A deceleration in the growth of agricultural production, as well as declining agricultural prices and insecurity in Northern and Eastern Uganda, have all contributed to the drag on agriculture,¹⁵ as well as more rapid economic growth in urban areas. Agricultural products are the main source of exports, accounting for as much as 85 percent of export earnings, and the country has run a substantial net agricultural export surplus for years. Coffee is the principal export, followed by tobacco, tea, and fish.

The Government of Uganda (GOU) has publicly committed to eliminate poverty, with the relevant policies contained in its Poverty Eradication Action Plan.¹⁶ The 2000 Plan for Modernization of Agriculture (PMA) has been a key part of this broad strategy based on transforming subsistence farming into commercial agriculture. The National Agricultural Advisory Services (NAADS) program¹⁷ is designed to support the implementation of the PMA. NAADS was intended to increase farmers' access to information, knowledge, and technology through effective, efficient, sustainable, and decentralized extension service delivery with increased private sector involvement. However, poverty levels in Uganda have remained high (24 percent in 2010), with the highest rate in the Northern Region of the country, at 46.2 percent.¹⁸ The impact of poverty-reduction strategies has, therefore, been minimal so far.¹⁹

¹¹ Note: 2014* National Population and Housing Census Provisional Results. Source: Uganda Bureau of Statistics (UBOS).

¹² UBOS, *ibid*.

¹³ Estimated from UBOS (2016) *Statistical annex*, Kampala.

¹⁴ UBOS, *ibid*.

¹⁵ FAO (2010) Uganda Nutrition Profile 2010. Nutrition and Customer Protection Division. Food and Agriculture Organization of the United Nations. Available at: <ftp://ftp.fao.org/ag/agn/nutrition/ncp/uga.pdf>.

¹⁶ MAAIF and MFPED (2000) *Plan for the Modernization of Agriculture: Eradicating Poverty in Uganda. Government Strategy and Operational Framework*. Kampala. Revised 2004.

¹⁷ MAAIF (2010) *NAADS Implementation Guidelines: Farmer Selection and Support for Progression from Subsistence to Commercialization*. NAADS Secretariat, Kampala. Available at: http://api.ning.com/files/rg-UCGYI8qGvMT6iQioHU8jSalGMG6as0621*UUdgrYK9-Zov5UdfCG4hNlSuwVL6tSLkPpsBkgWE-K0qmAjylmdc3ffB/FarmerselectionGuidelinesOctober29thDonors2.pdf.

¹⁸ UBOS (2015) *Statistical Abstract*, 2015, Kampala

¹⁹ Kaduru, R. (2011), *Chronic Poverty in Uganda: Is Anyone Listening?* Research paper, Fourth United Nations Conference on Least Developed Countries. Session on strategies for eradicating poverty in LDCs: Findings from research. May 10, 2011, Istanbul, Turkey. 21 pp. Available at: <https://assets.publishing.service.gov.uk/media/57a08adaed915d622c000947/Uganda-UNconf-ppt.pdf>

C. The Poultry Sector

One way NAADS has achieved these objectives has been to support improved poultry practices and products, including the introduction of more productive breeds. The national poultry flock in Uganda increased from 42.7 million birds in 2010 to 44.7 million in 2014.²⁰ This population includes both indigenous and exotic breeds. Egg production increased to 856 million units, compared to 784 million units in 2011²¹ (see Table 2). However, Uganda is a net importer of poultry birds or meat products mainly from Brazil and South Africa. The recent rise in domestic production is expected to save the country millions of dollars.

TABLE 2: POULTRY POPULATION AND EGG PRODUCTION, 2010-2014

Year	Indigenous (million)	Exotic (million)	Eggs (million)
2010	40.4	2.9	761.3
2011	35.9	5.0	784.1
2012	36.9	5.2	807.6
2013	38.1	5.3	831.9
2014	39.2	5.5	856.8

Source: Uganda Bureau of Statistics (UBOS, 2015)

Chickens make a major contribution to rural livelihoods.²² Of the 44.7 million chickens in Uganda, 86 percent are in village flocks; these are mostly indigenous varieties that are low-maintenance scavengers living in close proximity to their owners in small rural communities. The remaining 14 percent are raised in commercial units close to towns and urban markets. Village flocks range from 5 to 20 birds per household, with an overall national average of 12,²³ although this varies widely by region. Average egg production reaches 40 eggs per hen per year. The average rooster weight at the time of sale or consumption ranges from 1 kg to 2 kg; rural consumers neither desire nor can afford larger birds. Practices vary, but the birds are generally either raised by the women and girls of individual families or kept by rural cooperatives.²⁴ In both models, the chickens are free-range and roam village compounds unhindered.²⁵ The main work involved in raising them consists of collecting the eggs, checking for injury or disease, chasing away predators or thieves, and selecting birds for sale. Local chickens are mainly kept to provide occasional meat, eggs, and income to pay school or medical costs, for example. In addition, local chickens play a number of social-cultural functions.²⁶

Indigenous chickens suffer from a high mortality rate of 40 percent to 80 percent, depending on the region and the season. High on the list of reasons for this is the incidence of common diseases, which has increased in all regions. Of particular importance are coccidiosis and endemic Newcastle disease, both of which have been registered as frequently infecting almost entire flocks when epidemics (often

²⁰ *ibid*

²¹ *ibid*

²² FAO (2009a), *The Role of Poultry in People's Livelihoods in Uganda*, FAO/AHBL, Rome.

²³ Kugonza, D. R., C. C. Kyarisimma and A. Lisa (2008), "Indigenous Chicken Flocks of Eastern Uganda," *Productivity, Management and Strategies for Better Performance*, 20.

²⁴ The shape, size, and formality of these rural organizations vary, but a common setting for poultry is an association of women in a village or community who pool their resources to purchase and market poultry products. Formal cooperatives also exist but generally have wider aims, including poultry husbandry.

²⁵ FAO (2009) *op. cit.*

²⁶ For example, in the Acholi and Buganda tradition, chickens are given as part of the bride's "price" in marriage. The gizzard of a chicken must be served to the male visitor when the chicken is slaughtered in his honor. Among the people of the West Nile, cocks or hens with white plumage are used to cleanse cultural or ritual misfortunes, while black ones are used in rituals to condemn or curse social offenders. FAO (2009) *op. cit.*

linked to rainfall) occur. Other culprits for high mortality include predation, theft, and neglect. Nonetheless, local chickens have been considered superior to the imported exotic breeds that historically existed in Uganda. Indigenous breeds are more resistant to diseases, have a higher tolerance to heat and cold, are better scavengers, have better mothering ability, and will defend their young ones against predators.²⁷ These traits make them more suitable to the village setting.

Free-range indigenous chickens have low productivity. This is due in part to their intrinsic characteristics, and in part to the fact that free-range village production has not adopted better animal husbandry management techniques. Family flocks are left to roam and vaccination is uncommon. The potential for development of smallholder poultry production, particularly in the villages, holds considerable promise for meeting nutritional, income, and employment needs, in addition to balancing gender responsibilities among rural populations, since women tend to be responsible for the flocks.²⁸

Market Demand

High population and income growth, accompanied by increasing urbanization, has been raising the domestic demand for poultry products, a trend that is expected to continue.²⁹ Demand has been high for poultry products in hotels, schools, and other large institutions,³⁰ and Uganda's poultry products are being exported to neighboring countries even though it is a net importer. In 2014, four neighboring countries accounted for \$960 million of Uganda's \$2.43 billion in exports, or nearly 40 percent (see Table 3). When the region eventually enjoys a sustained period of peace, the regional poultry market should markedly improve, with substantial benefits for the Ugandan industry. Consequently, investors' interest has been growing in commercial chicken production in recognition of the good potential returns on investment accruing in commercial chicken production. With the arrival of large-scale operations,³¹ it is expected that the cost of chicken production will decline thanks to economies of scale. The resulting reduction in the market price for chicken meat and eggs should make them more affordable to the average income earner.³² In other words, the income elasticity of demand for poultry products is positive and high, and the (negative) price elasticity of demand is also high.

TABLE 3: TOTAL EXPORT VALUES AND SHARES FOR REGIONAL COUNTRIES

2014 Total Exports	Kenya	Rwanda	South Sudan	DRC	Total
\$ value (millions)	268	263	249	180	960
Share of total exports	11.0%	10.8%	10.2%	7.4%	39.5%

Table 3: Lists the 2014 value in total export (in millions) for Kenya, Rwanda, South Sudan, and the DRC as well as the percent share of total exports.

Source: Compiled from East African Trade Statistics database, accessible at <http://tradehelpdesk.eac.int/>

Types of Poultry Markets

Uganda has four types of poultry markets.

²⁷ Bushra, B. (2012), *The Status of Indigenous Village Chicken Production and Marketing System in Ethiopia*. Addis Ababa University. <http://en.engormix.com/MA-poultry-industry/meat-industry/articles/the-status-indigenous-village-t2392/471-p0.htm> and King'ori, A.M., A.M. Wachira and J.K. Tuitoek (2010), "Indigenous Chicken Production in Kenya: A Review." *International Journal of Poultry Science* 9 (4): 309-31

²⁸ Kusina J.F., and N.T. Kusina (1999), *Feasibility Study of Agricultural and Household Activities as They Relate to Livestock Production in Guruve District of Mashonaland with Emphasis on Poultry Production*. Report for the Household Agricultural Support Program (HASP), Zimbabwe.

²⁹ Interview with KCCA, July 2016.

³⁰ Interview with one of the largest poultry wholesalers, *Ugachick*, May 27, 2016.

³¹ See Kingdom of the Netherlands (2012), *Identification of Livestock Investment Opportunities in Uganda*, Agriterra, Arnhem.

³² Interview with KCCA citing KCCA policy, May 30, 2016.

1. **Informal markets** are predominately found in a rural setting and driven by the need of a farming family to meet some immediate financial need. Informal markets often consist of a sole young member of the family selling chickens or eggs roadside.
2. **Primary markets** are a collection of poultry traders from surrounding parishes who gather at the trading centers of small rural towns. The “market” is usually held in the open and lacks proper facilities such as holding areas, phytosanitary controls, and toilets. Trading occurs on specified days of the week that are announced in the local government gazette. These markets link to commercial traders who will usually resell the birds in larger secondary markets located in larger towns, hence the value of a bird is linked to its marketability in the secondary market.
3. **Secondary markets** are situated in market towns and cater to larger-scale traders who might offer a truckload of fowl for sale. In these markets, chickens are sold according to size, age, and appearance through negotiation between sellers and buyers, who are usually butchers, traders, or individuals. These secondary markets represented the traditional source of commercial chicken for urban consumers of all income segments until the arrival of factory-prepared chicken in the early 1990s. While factory-prepared chickens have eroded the secondary market share somewhat, live chickens still have the largest share.
4. **Urban markets** occur in the central markets of large towns and cities, such as parts of Kampala and in Lira and Gulu. They attract traders who buy chickens from the primary and secondary markets and sell to hotels, restaurants, and consumers. Competition from the dressed-chicken industry,³³ however, is rising, especially since the local poultry sold in the urban markets is expensive, lacks consistent quality, and can have unpredictable availability. The concept of dressed chicken has been well received in the towns and big cities, particularly by an urban elite whose choice of products is based on quality. The preservation by chilling or freezing and the attractive packaging of dressed chicken has an effect of enhancing perceived quality attributes. (At the same time, the last several years have seen a countervailing trend toward a preference for local birds that are considered more “authentic,” especially among the high-income segment.)

III. CHARACTERISTICS OF THE INNOVATION

The originator of Kuroiler chickens, Vinod Kapur, developed and commercialized them in India through his company, Keggfarms Pvt. Ltd. Keggfarms developed the breed as a means of improving the productivity and profitability of poultry production in rural areas, for both meat and eggs. Indian rural chickens typically were not particularly productive, compared to commercially raised flocks using hybrids for meat (broilers) or for eggs (layers). A rural Indian hen “was raised for six months and laid an average of 35 to 40 eggs over the subsequent 12 months; it reached a maximum weight of 1 kilo. ... The typical rooster grew to 1.2 kg over six months.”³⁴ Such low productivity meant that raising poultry was only marginally profitable.

The Kuroiler — a name derived from “Keggfarms,” “curry,” and “broiler” — was intended to change the economics of poultry raising for Indian rural farmers by introducing a chicken that had similar outward characteristics of local birds in terms of appearance and ability to survive by scavenging (thus not requiring expensive feed supplements), but with much higher productivity. The breed’s hens reach 2.5 kg in their first year and lay up to 200 eggs within their subsequent 12–16 month laying period, while

³³ Chickens are generally sold live by individuals and market traders. The dressed chicken industry kills, plucks, and cleans the birds, selling them either whole or as pieces in supermarkets or directly to institutions.

³⁴ Isenberg, D. (2007), *Keggfarms (India) – Which Came First, the Kuroiler or the KEGG?*, Harvard Business School, Boston.

the roosters could weigh up to 4 kg after a year and reach marketable weight (1 kg) after only three months. In the Indian context, the birds are resistant to disease and smart enough to escape predators. As a result, and because they are generally vaccinated, their loss rate is significantly lower (10 percent, compared to up to 80 percent for local fowl that are unvaccinated against common deadly diseases and are frequent prey for predators).³⁵

A principal aim of introducing Kuroilers was to make poultry profitable for the farmer and along the value chain. Keggfarms and the entire distribution network profited from the sale and distribution of Kuroiler chickens in India. This network consists of Keggfarms' own hatcheries, independent dealers of day-old chicks (DOCs), rural MUs — whose purpose is to raise DOCs through three weeks and provide the necessary phytosanitary care, including vaccinations — and, eventually, itinerant or semi-fixed vendors selling chicks to farmers.

The breed is an F1 hybrid. While it is not sterile, its offspring do not retain the full range of characteristics that make it attractive to farmers in terms of productivity, disease resistance, and so on. Later generations bred from Kuroiler stock, either Kuroiler-to-Kuroiler or Kuroiler-to-other, will lose all of the characteristics that make them outstanding after three generations or sooner. This phenomenon deprives owners of the possibility of breeding their own autonomous Kuroiler flocks and requires them to purchase new stock at regular intervals.³⁶ In addition to the genetic deterioration, Kuroiler hens do not have the gene for brooding — the parenting syndrome — so that the hens will not incubate their eggs. The absence of brooding means that chicks will not survive and develop without outside (human) assistance.

A. Kuroilers in Uganda

Three-quarters of Ugandan smallholder families raising chickens expect to derive some income from the sale of eggs or meat.³⁷ According to the Food and Agricultural Organization (FAO), “They are valued mainly for their ability to scavenge, disease tolerance, meat quality, and general hardiness...In rural communities, free-range chickens contribute significantly to the livelihoods of the households.”³⁸ However, the productivity of local chickens is low and because they roam unprotected, they are vulnerable to predators, theft, and disease that can result in the loss of up to 20 percent of the flock in completely free-range conditions.³⁹ Replacing local, indigenous flocks with more productive, resilient breeds thus offers potential for improving farmers' livelihoods, enhancing their general nutrition, and providing affordable poultry products to the national and local markets.

Thus, traditional poultry varieties in Uganda — and in East Africa generally — suffer from many of the same shortcomings as the smallholder rural Indian variety: lengthy maturity times, poor productivity in terms of eggs, vulnerability to disease and predators, low rooster weights, and small egg sizes. The introduction of a new breed that could overcome these shortcomings had the potential to significantly impact the lives and incomes — and therefore the quality of life — of rural families. However, intrinsic

³⁵ Sharma et al (2015) “Higher weight gain by Kuroiler chickens than indigenous chickens raised under scavenging conditions by rural households in Uganda,” *Livestock Research for Rural Development*, 27 (9).

³⁶ Usually 18 months or less, depending on whether the birds are kept for meat (maturity for sale at 4 or 5 months) or for eggs (since the hens lay for 17 – 18 months)

³⁷ Anderson, J., C.E. Learch and S.T. Gardner (2016), *National Survey and Segmentation of Smallholder Households in Uganda: Understanding Their Demand for Financial, Agricultural, and Digital Solutions*, World Bank/CGAP, Washington D.C.

³⁸ FAO/AHBL (2009) *Poultry Genetic Resources and Small Poultry Production Systems in Uganda*, FAO, Rome.

³⁹ FAO/AHBL (2009) *ibid*.

to the successful adoption of the new breed is the acquisition at the same time of a package of innovations including phytosanitary care, penning, and overall more modern management of the flock.

These similarities led to research at ASU's Biodesign Institute into whether Kuroiler chickens could be introduced successfully into the East African rural context.⁴⁰ Initial laboratory results were promising and the ASU team sought partners in the region to carry out field trials. By 2009, a working relationship had emerged between ASU and the MAAIF in Uganda that was looking for ways to integrate improved poultry production into the GOU's overall agricultural strategy.⁴¹

In 2009, the NAGRC and ASU conducted a pilot project using rural small farmers to evaluate the suitability and adaptability of Kuroilers to the Ugandan environment. For the study, 10 Kuroilers and 10 indigenous chickens were distributed to 100 families in five districts.⁴² As a control, 100 Kuroilers and 100 indigenous chickens were held in confinement at a facility in Entebbe. The study showed that the fertility and hatchability of Kuroiler eggs was significantly better, with 80 percent of Kuroilers successfully hatching, compared with 47 percent of indigenous eggs (see Table 4). Body weight gain and overall adult total weight for Kuroilers was higher — 3 kg for male Kuroilers as opposed to 1.5 to 2.0 for indigenous male chickens. Overall, the most important advantage of the Kuroilers was their egg-laying capacity, which was much higher than indigenous birds in both village-scavenging settings or confinement-raised; Kuroilers delivered around 200 eggs annually compared with 40 for indigenous species. Overall, the study demonstrated that Kuroilers represented a 133 percent increase in meat production and a 462 percent increase in egg production.⁴³ The pilot study suggested a potential 341 percent increase in income for rural poultry farmers — often village women — important progress toward nutritional and economic security for these farmers. In addition, in the pilot survey, Kuroiler chickens were reported by participants to be superior in taste.⁴⁴ Unfortunately, a key part of the pilot that was not replicated at scale was extensive technical support to the pilot farmers.

TABLE 4: PRODUCTION COEFFICIENTS OF LOCAL CHICKENS IN UGANDA VS KUROILERS, AS REPORTED BY SCHOLARS

Reference	Clutches per year	Eggs per clutch ^a	Egg weight (grams)	Inter-clutch average (months)	Hatchability	Mature weight (kg)	
						Cock	Hen
Local							
Ssewanyana et al. (2003)	2.0 – 2.4	13 – 15		2.7	82.3% – 90.9%	1.7 – 2.4	1.2 – 1.6
Kyarisiima (2004)	2.5 – 3.0	6 – 20	40-50		40% – 100%	1.5 – 2.5	1.0 – 1.5
Kuroilers							
Sharma et al. (2015)	-	150 – 200	>60 ^b	-	-	3.0 – 5.0	2.0 – 2.8

⁴⁰ This research was not funded by Gates or another major donor.

⁴¹ The core of this strategy is its 2010–11 to 2014–15 Development Strategy and Investment Plan (DSIP), a revision of the first DSIP of 2005–06 to 2007–08. The objectives of the DSIP, which is being implemented by the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), are: i) Promote agricultural enterprises that enable households to earn daily, periodically and/or long-term incomes to support food purchases; ii) Strengthen the capacity of farmers and farmer groups and support them to scale up farm level production and productivity; iii) Promote appropriate technologies and practices for minimizing post-harvest losses along the entire value chain; and iv) Develop and improve food marketing and distribution systems and linkages to local and export markets.

⁴² <http://www.thepoultrysite.com/poultrynews/23166/more-productive-chickens-help-poor-ugandans/>

⁴³ <http://www.keggfarms.com/pdf/Spreading-Out.pdf>

⁴⁴ Semambo et al, *op. cit.*

Notes: a) Kuroilers do not brood, hence there is no clutch as the hens lay constantly, with no sitting on the eggs or caring for the hatchlings; b) average from interviews and data from NAGRC, Entebbe.

Source: FAO/AHBL (2009) Poultry Genetic Resources and Small Poultry Production Systems in Uganda, FAO, Rome.

B. Good Management Practices and Farmer Training

While part of the attraction of Kuroiler chickens is that their appearance is similar to local birds, their requirements for maximum benefits are different. The claim that Kuroilers are more resistant to disease is valid only if the birds are properly cared for in the first three weeks of life, including their need for a specific vaccination protocol. “Kuroilers require a high level of care (vaccination, feed, and heating) during the first three to four weeks of life, and farmers in the backyard or household category are often unable to provide this level of management.”⁴⁵ Moreover, there are strict rules about the handling and storage of vaccines. One of the reasons for preferring to sell three-week old chicks (TOC), rather than DOCs, is the need for vaccination, but TOCs are much more expensive (see Section IV).

Most small farmers were not in the habit of vaccinating their chickens, and certainly not in adherence with the protocol that Kuroiler chicks require. Farmers did not necessarily know how to access these vaccines and could not afford to pay for them and administer them, nor could they easily recognize when their flocks were affected by disease. Moreover, improved, thermostable vaccines that do not need strict adherence to a cold chain are generally unavailable in Uganda. Thus, to have maximum benefit, scaling of Kuroilers required a substantial change in management practices supported by improved and widely accessible veterinary support services and, eventually, the introduction of improved vaccines.⁴⁶

There is little evidence of widespread understanding of the specific needs of Kuroiler flocks among farmers. For example, despite the sale of more than two million Kuroilers, there is little evidence of major increases in the sales of veterinary supplies, including the cold-chain flasks needed to transport the fragile vaccines from the town to the farm. At least, there is no systematic collection and publication of this data by the partners, so it cannot be used as a proxy for measuring adoption of improved phytosanitary practices. One farmer interviewed for this study reported losing 500 birds from a first flock of 700, then half of a subsequent batch of 600 Kuroilers through infections that could have been prevented.⁴⁷ Another farmer from Jinja District had participated in a trial project in 2012, but lost his 12 birds due to an unidentified disease; as a result, he concluded that “it was not a viable project and I was not well trained to manage these birds.”⁴⁸ While no systematic data or survey is available to confirm the frequency of such events, the abundance of anecdotal information suggests that they may be widespread.

NAGRC was supposed to undertake training, as well as promote adoption of Kuroilers. There seems, however, to have been little definition by the partners of what this training was to consist of and how it was to be delivered. Apart from promotional radio spots and some field meetings organized by local veterinary or production officers, direct purchasers from NAGRC were advised to follow the vaccination protocol. In the pilot study, participants were closely monitored and given training in vaccination and disease control through penning, but this close attention was not offered subsequently. MU operators were given training by NAGRC and ASU — and later by Chick Masters — with some funding from BMGF in the veterinary management of the birds. They were supposed to pass on information about flock management to customers, but little evidence exists to suggest that they did so.

⁴⁵ Wellspring Development (2014), *The Kuroiler Chicken in Uganda: Performance and Market Potential in the Backyard Poultry Sector*.

⁴⁶ Based on interviews with DVOs, KCCA officials, and MAAIF personnel.

⁴⁷ Interview, June 22, 2016, Otim's Poultry Farm.

⁴⁸ Interview, May 20, 2016, Bugembe Sub-County, Jinja District.

The MUs also received some management and bookkeeping training from BMGF, although it is not clear how this was delivered, nor by whom.

Another challenge for realizing the benefits of Kuroilers was small farmers' lack of experience with marketing. Country dwellers often live in isolated communities and know little about how to get the eggs to market, what price to sell at or how to estimate the quantity of eggs that the market could absorb.⁴⁹ Farmers who had been involved in early trials of raising Kuroilers reported abandoning the breed because they produced *too many* eggs. There seemed little point in feeding birds to produce eggs that could not be sold.⁵⁰ These considerations also apply to marketing birds for meat, though to a lesser extent, because roadside sales of live birds are commonplace and most families have some experience of this practice. The scaling strategy adopted by the partners — ASU, NAGRC, and BMGF — does not appear to have included marketing and business-skills training in the original scaling-strategy package.

C. Impacts on Current Practices

Flock Management

In rural areas, Kuroilers can simply be left to roam and scavenge. However, “although Kuroilers can survive on a pure scavenging diet, observations among Ugandan farmers showed that nutritional disorders were common.”⁵¹ Unless they have a very wide feeding range per bird, they will quickly exhaust the ad-hoc food supply, because “while the natives are moderate while scratching for food and may even take a rest, Kuroilers are aggressive and feed continuously. This explains why they put on weight faster than the local breeds.”⁵² Even in India, “a Bengali Kuroiler farmer was not quite convinced of the scavenging ability of the Kuroiler. In her view, Kuroiler are not as good as desi (local birds) as far as scavenging ability is concerned and therefore need supplementary feeding. The Kuroiler scavenge throughout the day and are still hungry, she says: ‘If I do not give them paddy (rice), they peck at my sari and demand food.’”⁵³ This also explains why farmers complained to the review team in Uganda that Kuroilers had denuded their compounds and gone scavenging in the neighbors' yards, which did not make for good relations in the community.⁵⁴ To deal with this scavenging problem, farmers have two options: limit the number of birds (and, consequently, the economic benefits of raising them) or create fenced areas where their movements can be restricted but they can receive supplementary feed.

Both solutions require a major change in farmer practices. Raising chickens in Uganda usually falls to the women, who are busy with other domestic tasks or paid employment; they are not used to managing their flocks actively. Eggs are either left to be brooded, producing more chicks, or are harvested when they are noticed; cocks are allowed to roam freely until they reach a reasonable size and are then either butchered and eaten or sold when the household needs money. It is also rare for a rural family to

⁴⁹ Natukunda, K., D.R. Kugonza, and C.C. Kyarisiima (2011), “Indigenous Chickens of the Kamuli Plains in Uganda: II Production System and Flock Dynamics,” *Livestock Research for Rural Development* 23 (10) 2011

⁵⁰ Similarly, in an urban environment, Kuroiler farmers reported difficulties in marketing the eggs. They did not have transport or did not have access to a market stall; in some cases, they did not even know the location of the best market. Most of these urban farmers were new to the activity, but they have the advantage of being in close proximity to the municipal authorities who can help them resolve their problems.

⁵¹ Wellspring Development *ibid.*

⁵² Interview with Dr. Esau Galukande, KCCA, Kampala, May 30, 2016.

⁵³ Ahuja et al (2008), *Poultry-Based Livelihoods of Rural Poor: Case of Kuroiler in West Bengal*, South Asia Pro-Poor Livestock Policy Program, New Delhi and FAO, Rome.

⁵⁴ This complaint was voiced in all districts visited and was the explanation for a change in tactics from full free-range to partial confinement with supplementary feed procured either at the market or from farmers' own maize crops.

purchase feed for chickens, and according to multiple reports,⁵⁵ the chicken feed available throughout the country is frequently adulterated and inappropriate for raising healthy chickens.

In the urban environment of Kampala, according to interviewed local government officers, almost all of those who are now raising Kuroilers had never raised chickens. They are, therefore, embarking on a new path. However, support from local authorities was much more available than it was in the countryside, especially since the local government supplied the chicks and monitors their development as part of the urban anti-poverty strategy.⁵⁶ In an urban setting, the birds have been automatically caged because of lack of space, which entails careful management both of feed and of waste. KCCA advisors recommended using vegetable leftovers from local markets that can be obtained for free or cheaply as part of the birds' diet. In one case, for example, a chicken farmer exchanged eggs for green waste feed at the rate of a dozen eggs per week, which amounts to the equivalent of UGX 4,000 (USD \$1) out of a regular weekly income from egg sales of some UGX 36,000.⁵⁷ Overall, the anecdotal evidence collected by the review team tends to suggest that — despite some marketing problems — urban Kuroiler farmers tended to have a higher success rate than their rural counterparts, with higher levels of enthusiasm and satisfaction. This outcome merits greater attention including monitoring to see if the trend continues over time.

Breeding

One of the major elements of the Kuroiler project — and one that is least often understood — is the continued dependence on the Indian genome held by Keggfarms, often referred to as the “grandparent stock.” These birds produce the parents of Kuroilers. If Ugandans had direct access to these chickens, they could produce parent stock — and therefore Kuroilers — continually. However, this grandparent stock has never been released to a Ugandan breeder.

Another key part of the innovation package in which Kuroilers need to be embedded is a different understanding of breeding and reproducing farmers' flocks. In the countryside, smallholders are used to leaving their flocks to roam unhindered, as discussed, to feed, but also to mate. In addition to the effect they have on available food supplies, Kuroiler cocks also will mate with any available female birds, whether they be of the same breed or not. This has multiple undesirable consequences.

Kuroiler males mating with a Kuroiler female would produce an F2 hybrid if the subsequent eggs could be incubated either artificially or under a local hen. As noted, Kuroilers lack the gene for brooding and therefore will neither sit on their eggs nor manage their chicks, so without external help the eggs will not develop and hatch. Assuming that a farmer could find a way to incubate the eggs and produce chicks, productivity progressively diminishes in F2 and successive generations.⁵⁸ Hence, the farmer would not get more genuine Kuroilers, but would have a weaker strain that would still require all vaccinations and veterinary care that the original birds need, with fewer benefits. Outcomes are not absolutely predictable and some farmers will find that their F2s closely resemble their parents, but others will discover smaller, less productive birds as a result. Later generations will have fewer Kuroiler characteristics and will eventually lose almost all of them.

Mating Kuroiler cocks with local hens poses a different set of issues, whether the mating is by accident or design. While the body weight of the cocks is an important element in their marketing, their sheer

⁵⁵ For example, from the resident USAID Mission, local government agents, and farmers interviewed for this review.

⁵⁶ Interviews with KCCA officials and urban farmers, May 30, 2016.

⁵⁷ Interview with Ms. Margaret Nakayama, May 30, 2016, Kamwokya II Parish, Kampala.

⁵⁸ Sharma, J., et al (2015), “Higher Weight Gain by Kuroiler Chickens Than Indigenous Chickens Raised Under Scavenging Conditions by Rural Households in Uganda,” *Livestock Research for Rural Development*, #27 (9).

size can — and often does, according to interviews — result in severe damage and possibly death for the local hen.⁵⁹ The only solution is to keep the breeds separate, which implies building enclosures and “policing” them to prevent opportunities for mating. When a hen does survive the mating process and produces eggs, the resulting offspring will lack the brooding gene and potentially other characteristics of Kuroilers that are more desirable. After several generations, this could result in the extinction of the rural indigenous chicken, since few farmers possess incubating facilities.⁶⁰ Farmers seem to be unaware of this danger and continue to breed “Kuroilers” from genuine FI birds with local hens.

Counterfeit Kuroilers have infested the marketplace and are appearing all over the country. Some result from an honest misunderstanding and others are reportedly part of a criminal operation that authorities have identified.⁶¹ The problem lies in detecting genuine Kuroilers, a precaution farmers have not had to take in the past and one that requires a new level of vigilance. There is currently no systematic and agreed labeling of genuine Kuroilers, so there is absolutely no way that a purchaser of a DOC or TOC can be certain they are purchasing an authentic Kuroiler, other than purchasing directly from NAGRC or Chick Masters, or from one of the approximately 70 MUs authorized to sell TOCs. There is also no monitoring of MUs to ensure that they are not marketing other breeds as Kuroilers, or breeding Kuroilers and marketing F2s as F1s. These problems can only be solved by education that establishes the principle that Kuroilers can only be obtained from certified retailers and through policing to ensure that those authorized retailers are not misrepresenting other birds as Kuroilers. Unfortunately, such methods of surveillance and control do not exist in Uganda.

D. Ancillary Benefits

Nutrition

The assumption when Kuroilers were introduced to Uganda was that smallholder families would consume at least part of the meat and eggs. According to information obtained by the review team, this does appear to have happened, at least partly because of the sheer volume of egg production that exceeded the absorptive capacity of the local marketing system (e.g., roadside offering, travel to local informal and primary markets, etc.). The evidence is anecdotal, however, because reliable statistical evidence is absent. Nonetheless, all of those interviewed who were raising Kuroiler chickens reported increased consumption of eggs and more frequent consumption of the meat. One reason for the increase in meat eating was the paradoxical “problem” that Kuroiler cocks became too big — and, therefore, too expensive — for the market. Moreover, farmers were not given the possibility to choose between male and female DOCs or TOCs. Use, for example, of the Strengthening Partnerships, Results and Innovations in Nutrition Globally (SPRING) agriculture-to-nutrition pathways framework to analyze end use would inform understanding of these issues.⁶²

⁵⁹ Carym Farmers’ Group, Unyama Village, Gulu District, while generally supporting Kuroilers, reported the deaths of more than a dozen hens and the maiming of many more from being mounted by aggressive Kuroiler males.

⁶⁰ The genetics of this are quite complex and the eventual dominance of the non-brooding genetics cannot be perfectly predicted.

⁶¹ Communication from Dr. Nicholas Kauta, Commissioner, Animal Resources, MAAIF, July 4, 2016: “I presented the matter (of fake Kuroilers) to the agricultural police ... the system seems to survive on graft (and) evidently the (criminals) have made more money from the Kuroiler brand than the genuine persons.” However, the commissioner of the Agricultural Police said on July 7, 2016, that he had not heard of people complaining that they purchased counterfeit Kuroilers.

⁶² See www.spring-nutrition.org.

Female Empowerment

The successful rearing of Kuroilers has the potential to generate extra income for the household from a source that is traditionally female-dominated.⁶³ Indeed, ASU and NAGRC emphasized the participation of women in the Kuroiler project, holding workshops specifically for women and attempting to involve women in running MUs, an effort that seems to have been somewhat successful.⁶⁴ Anecdotal evidence collected by the review team suggests that when Kuroilers are raised in optimal conditions, they generate more income than local birds do for women, who are thus able to contribute more to the household income. Women appear to have greater control over the funds they earn, which may increase the influence they have over household expenditures. Consistent with general research in the field on the effect of increasing women's income, several interviewees reported that they had used their Kuroiler earnings to pay for school fees and expenses.⁶⁵

Graduation

There is some suggestion that becoming proficient in raising Kuroilers may open the door for small farmers to enter the commercial poultry business.⁶⁶ Despite some examples of this, no evidence shows it to be a widespread development.⁶⁷ The principles involved in managing a flock of Kuroilers are similar to those applied to a commercial poultry farm. Where a sizeable market for meat and/or eggs exists, so may openings for additional commercial suppliers. This is particularly the case close to the borders, where export trade is relatively easy to conduct, and in the large provincial towns that are undersupplied and need to obtain both eggs and chickens from Kampala.

IV. BUSINESS CASE FOR THE INNOVATION

Kuroiler chickens have the potential to provide a steady revenue stream for rural and urban households. With proper management, they can outperform local, indigenous birds both in the rate of growth of males destined for meat and in the egg production of hens. This section looks at the profitability of Kuroilers for each actor in the value chain. Table 5 shows the profitability for breeding chicks with two feed scenarios, and includes the value of selling the birds for meat at the end of their breeding life.

⁶³ Natukunda, K., D.R. Kugonza, and C.C. Kyarisiima (2011), "Indigenous Chickens of the Kamuli Plains in Uganda: Production System and Flock Dynamics," *Livestock Research for Rural Development* 23 (10) 2011, finds that 66 percent of chicken farmers in Eastern Uganda are women. It seems reasonable to assume that the figure is similar throughout the country, though the research team did not verify this.

⁶⁴ Interim report, ASU, October 2016 (unpublished).

⁶⁵ A particularly graphic demonstration of this was from the chairperson of a Dinka refugee women's group at the Kiryandongo camp, who said that Kuroilers that Ugandan NGO TPO supplied to her group had been sold to support the schooling of the group's children in the nearby town.

⁶⁶ Interim report, ASU, interview with poultry farmer in Lira, June 23, 2016.

⁶⁷ Interview with a poultry farmer in Lira, June 23, 2016.

TABLE 5: COST OF PRODUCTION FOR KUROIILER CHICKENS AT PARENT FARM UNDER TWO FEED SCENARIOS

Cost Item in Ugandan Shillings	Use of 20% Commercial Feed	Pure Scavenging (Actual)
Purchase of parent stock	-439	-439
Feed cost (including savings)	-2,298	-1,839
Vaccines	-5	-5
Other direct costs	-73	-73
Overhead contribution	-422	-422
Total cost to produce DOC	-3237	-2709
Revenue from meat sales of parent birds	1,157	1,157
Net cost to produce DOC*	2,080	1,552
Possible sale price for a DOC	2,500	2,000
Net Return	420	448
Return on Investment	20%	29%

Source: Wellspring Development (2014), *The Kuroiler Chicken in Uganda: Performance and Market Potential in the Backyard Poultry Sector*

The next step in the production chain is MUs who purchase DOCs and turn them into TOCs. Early in the process, MUs purchased their stocks from NAGRC or Chick Masters at (February 2014) UGX 2,500 and sell them at 3 weeks old for UGX 5,500, on average. Based on these prices, Table 6⁶⁸ illustrates the theoretical commercial viability of the MUs. Because of economies of scale, only MUs capable of handling 2,000 DOCs or more in a single shipment can expect to make a profit and remain in business. In interviews with the review team, MU operators confirmed this theoretical outcome. Many MU operators involved in Phase I of the Kuroiler project in 2012 had gone out of business or had converted their operation to a standard commercial poultry operation.

Since 2014, prices have increased to UGX 2,600 for DOCs and UGX 7,000 for TOCs. MUs purchase DOCs in quantity and, although the suppliers have already culled the weaker specimens and those with obvious defects, an expectation remains that losses will occur, despite the specialized care that the MUs are supposed to provide. In addition, the MUs need to maintain their premises, pay for services such as power, and cover running expenses. All of this contributes to the UGX 7,000 price per chick. However, this does not change the result significantly, since overhead costs — e.g., transport, power, and miscellaneous expenses — have also risen. More importantly, the increase in the price gap between DOCs and TOCs has created significant incentives for farmers to buy DOCs, so that the pricing of these chicks and the lack of training and extension support on care are misaligned.

TABLE 6: UGANDAN MOTHER UNIT PROFITABILITY AT DIFFERENT SCALES

Profitability Factor	Profitability per Number of Kuroiler Chicks/Cycle				
	500	1,000	2,000	4,000	8,000
Revenue per cycle	\$1,057	\$2,114	\$4,227	\$8,455	\$16,909
Direct cost per cycle	-\$938	-\$1,722	-\$3,291	-\$6,428	-\$12,703
Gross profit per cycle	\$119	\$391	\$936	\$2,026	\$4,207
Gross Profit Margin	11%	19%	22%	24%	25%
Overheads	-\$308	-\$410	-\$615	-\$1,025	-\$1,845
Cost of finance	-\$19	-\$33	-\$60	-\$115	-\$224
Net profit per cycle	-\$208	-\$52	\$261	\$887	\$2,138
Net Profit Margin	-20%	-2%	6%	10%	13%

Table 6: Compares the profitability factor with the profitability per number of Kuroiler chickens per cycle.

⁶⁸ Wellspring Development, *ibid*.

Source: Wellspring Development, *op cit.*

In the Indian context that the Ugandan model is based on, the 2,000 chick threshold does not appear to be significant (see Table 7). This is an important difference in the two countries' business cases.

TABLE 7: ECONOMIC ANALYSIS AT MOTHER UNIT LEVEL (WEST BENGAL)

Item	South 24 Parganas	Murshidabad	East Midnapore	Jalpaiguri
Chicks bought	1,510	530	3,445	1,480
Chicks sold	1,458	497	3,322	1,356
Purchase price (INR)	10.1	11.3	9.7	10.7
Sale price (INR)	17.5	35.9	14.6	27.9
Mortality rate (%)	5.7	5.4	3.6	6.4
Gross margin/bird	7.4	24.6	4.9	17.2
Cost (INR)	6,473	8,093	10,330	15,679
Net income/month (avg. INR)	4,570	5,093	3,837	5,357
Net income/bird	2.4	11.3	0.9	3.7
Age at sale (days)	17.5	30.8	15.3	22.7

Source: Ahuja et al (2008), *Poultry Based Livelihoods of Rural Poor: Case of Kuroiler in West Bengal*, South Asia Pro-poor Livestock Policy Programme, New Delhi and FAO, Rome.

Other differences exist between the Indian operation and the Ugandan experience. In India, the smallest MU made the most profit per bird and maintained its stock for the longest time. In Uganda, not only is the size of the MU significant, but interviews suggested that the optimal time to market Kuroiler chicks in terms of profitability was at three weeks, when the vaccination protocols had also been respected.⁶⁹ Beyond that point, the cost of feed outpaced the increase in the value of the birds.⁷⁰ The reasons for these differences are unclear and would require a separate study of the Indian system, which itself manifests large differences in experience. In particular, it is unclear whether the Indian MUs also raised chickens for their eggs and meat and so were able to subsidize their operations as MUs from this activity's profits, which is rarely the case in Uganda.

In the Kuroiler project, the promoters — ASU, NAGRC, BMGF, and Keggfarms — assumed that farmers would purchase TOCs from the MUs. In reality, partly because of the scarcity of MUs (only 70, and not all constantly operative, for the national territory to serve 2 million smallholder poultry farmers) and partly because of price, many farmers prefer to buy DOCs directly from either parent farm.⁷¹ It appears from interviews that farmers did not understand the inherent and costly risks involved in acquiring unvaccinated DOCs, which may indicate a lack of awareness-raising on the part of the promoters. While individual farmers may not have these overhead expenses, they do need to have received adequate education and training to know how and when to vaccinate. Few farmers have the means and knowledge to produce their own vaccinated and healthy TOCs.

The purchase of the cheaper DOCs, therefore, may be a false economy because DOCs are vulnerable to disease unless the consumer adheres to a strict vaccination protocol (often not the case because of the farmer's lack of knowledge), the price of vaccines or their availability, and the need to continue beyond the three-week threshold.⁷² The failure to provide sufficient incentives for farmers to obtain their supplies from MUs may explain why almost half of all sales from both suppliers were still of DOCs to individuals directly from NAGRC and Chick Masters, rather than to MUs, in late 2016 — five years

⁶⁹ Effective vaccines for certain pathologies exist that can be administered to DOCs without further revaccination. However, these products are as yet unavailable in Uganda and have not been tested there on Kuroiler chickens.

⁷⁰ Estimate from Elya Demonstration Farm, Lira District.

⁷¹ Farmer interviews and discussions during visits of the survey team to NAGRC and Chick Masters, May–June 2016.

⁷² Interviews with MU manager and commercial farmer clients, Elya Demonstration Farm, Lira District, June 23, 2016.

after the start of the project. It may also be a question of cash flow and investment constraints, which would need to be explored and addressed if indeed it is the case.

Farmers purchase Kuroilers to raise them for meat, egg production, or both. Since the birds are advertised as being more productive in both meat and eggs, while still basic scavengers, farmers initially believe that they will incur only the initial purchase price. Interviews with farmers during the field survey revealed that they are quickly disabused of this idea and find themselves needing to purchase or manufacture supplementary feed and invest in fencing. Those who purchased DOCs also need to buy and administer vaccines (see Table 8).

TABLE 8: ESTIMATED COST IN UGX OF KUROIILER CHICKS AT 3 WEEKS OF AGE (INITIAL FLOCK OF 100 BIRDS)

Type of Chick	Purchase Price per Bird	Vaccinations and Feed	Loss Rate	Final Cost at 3 Weeks
DOC vaccinated	2,600	885	7%	3,747
DOC partially vaccinated	2,600	885	27%	4,774
DOC not vaccinated	2,600	600	47%	6,038
Three-week old chicks	7,000	-	-	7,000

Assumptions: Vaccinations and feed represent 36 percent of the gross cost; partially vaccinated flocks are improperly vaccinated, rather than receiving fewer of the required doses; loss rates in the DOC vaccinated scenario are due to predation, theft, accident, and transport, not disease.

Source: Authors' calculations based on interviews and data from Natukunda, K., D.R. Kugonza, and C.C. Kyarisiima (2011), "Indigenous Chickens of the Kamuli Plains in Uganda: Production System and Flock Dynamics," *Livestock Research for Rural Development* 23 (10) 2011, and Wasake, D. (2013), *Investing in Poultry Farming in Uganda*, Manchem Consultants, Durban.

For farmers who maintain a healthy flock, the fact that Kuroiler cocks grow at a faster rate and reach a higher weight than domestic birds is not necessarily an advantage. The review team received reports from interviews in markets at every level that the larger-size Kuroilers *reduced* their marketability because they became too expensive for rural consumers. In other words, just as sachet sizing⁷³ makes products affordable for the poor, in this case the "packaging" was too big. Thus the interest in raising Kuroilers instead of local birds was the speed of their weight gain, which allowed the farmers to realize the profit on their investment more quickly. Interviews with Kuroiler producers suggest that the lesson has been learned, but also that some farmers have lost money through unsold stock that continued to gain weight and became unmarketable. Some are now discouraged from continuing with the breed.

Kuroilers sell at roughly the same price as a local chicken of equivalent size. In September 2016, according to Info-Trade Uganda,⁷⁴ local mature chickens (8 to 11 months old) for meat were selling for just over UGX 19,000 retail and for UGX 15,500 wholesale at the farm gate. Five-month-old Kuroilers (i.e., roughly equivalent size and weight) were offered for sale at UGX 20,000 (USD \$5.62) wholesale and UGX 25,000 (USD \$7.02) retail, which represents a premium from which farmers can profit if they recognize the need to market their chickens before they become too large to be affordable.

The egg market has been buoyant in Uganda as tastes and incomes change and the demand for eggs in the urban areas and provincial towns grows. The industry has specifically benefitted from the market in

⁷³ Sachet sizing is a marketing approach to make products affordable to consumers at the bottom of the pyramid, i.e., less than a few dollars per day. As these consumers are often severely cash-constrained, putting small quantities into single-serving packets can make products affordable. In India, 95 percent of shampoo units sold are sachet-sized, accounting for 65 percent of sales value.

⁷⁴ www.infotradeuganda.com.

South Sudan, where prices have been higher and demand has risen, especially in the capital city of Juba. However, the market in Northern Uganda suffers and demand dwindles every time violence flares up across the border.⁷⁵ Farming Kuroilers for eggs is profitable at a range of prices (see Table 9).

**TABLE 9: PROFITS PER BIRD FROM MEAT AND EGG PRODUCTION
IN A SEMI-SCAVENGER SYSTEM (UGX)**

Factor	Local		Kuroiler		Total Local	Total Kuroiler
	Meat	Eggs	Meat	Eggs		
Length of cycle (months)	10	24	5	17	34	22
Laying performance	-	80%	-	80%		
Income from meat sales (UGX)	17,000	8,000	25,000	12,000	25,000	37,000
Income from egg sales (UGX)	-	13,000	-	105,000	13,000	105,000
Expenditure and losses (UGX)	9,700	18,100	14,637	99,357	27,800	114,000
Total profit per bird (UGX)	7,300	2,900	10,363	17,643	12,200	28,006
Gross profit (%)	75	16	71	18.75	44	24
Monthly profit (UGX)	730	788	2,072	1,100	359	3,172

Source: Authors' calculations, adapted from Wellspring (2014).

Assumptions: Kuroiler poultry meat prices remain at or around UGX 25,000 per bird at the farm gate; egg prices remain at least UGX 15,000 per tray; Kuroilers lay at the upper limit of 210 eggs per 17-month lifetime; farmers manage to market all of their Kuroiler production; and local chickens survive by scavenging only with all flock renewal through brooding.

Notes: "Expenditure and losses" includes the purchase price (for Kuroilers), feed, veterinary costs, loss of expected sales due to bird deaths, fencing and security, and overhead costs including transport. The apparent lower profitability of Kuroilers for meat is offset by the shorter maturation period (five months), which means a farmer can raise twice as many Kuroilers as local chickens in the same time. "Monthly" profit is derived from the profit per bird divided by the number of months it takes to reach that level, hence the gross profit from a local bird raised for meat is UGX 7,300/10 = 730; for a Kuroiler, UGX 10,363/5 = 2,072.

Table 9 clearly demonstrates the commercial advantages of raising Kuroilers over local birds, but Kuroilers need greater care; combined with the greater investment needed, they pose greater risks. The profitability levels in Table 9 depend on a semi-scavenging system, which implies some sort of limitation on the bird's movement; this at least would have the added advantage of protecting them from predators and thieves.

Despite the anticipated higher profit levels, Table 9 indicates that raising Kuroilers requires an initial investment that is four times the cost of raising local chickens. These relate largely to whether the birds will be raised as scavengers, semi-scavengers, or intensive feeding. An intensive system is the most profitable, but requires the construction of fencing and 100 percent feed. Its much larger initial outlays and cash flow requirements likely put it out of reach for smaller farmers, especially as fencing is subject to significant economies of scale. A scavenger system is cheapest but has the lowest returns over time, as the farmer will suffer from slower bird growth and later onset of egg-laying. If one of the objectives of the smallholder is to recoup the initial outlay as soon as possible (one advantage of the Kuroiler breed due to their earlier maturity and higher egg productivity), a semi-scavenging system would be the most rational. A farmer could also adopt an intensive system — fully caged birds dependent on processed feed — but this would involve a much higher initial outlay in terms of equipment and premises, as well as the high cost of feed. Such a system would require an initial investment of UGX 28,342,419 for 1,000 birds.⁷⁶ For a smaller flock, this figure cannot be reduced pro-rata, since some of the outlay involves fixed assets and training and power, as well as others that can be eliminated, such as paid employees

⁷⁵ In September 2016, because of renewed and intense fighting, the South Sudanese market was completely closed to Ugandan trade, including eggs. Egg prices in Northern Uganda fell from UGX 19,000 to around UGX 12,000 to 15,000 per tray of 30 units in mid-2016 because of oversupply. (Interview, local authorities in Apac, June 22, 2016.)

⁷⁶ Wasake, D. (2013), *Investing in Poultry Farming in Uganda*, Manchem Consultants, Durban.

who would not be necessary in a smaller operation. Nonetheless, opting for a commercial, fully processed feed procedure would be out of reach for most rural smallholders and urban backyard poultry farmers.

In 2010, the average rural monthly household income was UGX 222,600,⁷⁷ and is not expected to have risen significantly since then. Hence a farmer subsisting on this level of household income could afford to invest in only a few birds. A better-off farmer with 10 Kuroilers for meat and 10 for eggs would be earning a theoretical 14 percent of the average rural monthly income, which may imply that the bird's main appeal will be to higher-income households. Of course, such a farmer probably would already be raising local chickens in similar numbers, but the income derived from them would be much smaller because of the length of time it would take for the male birds to reach saleable size (10 months, as opposed to 5) and the lower rate of egg production (40 in total for the local bird, versus 210 for the Kuroiler). A farmer could make a profit from each individual local bird sold for meat (UGX 7,300), but it would take twice as long as it does to earn UGX 10,363 from Kuroilers. Thus, in the time it takes to earn UGX 7,300 from a local chicken, two Kuroilers would have earned UGX 20,723. In terms of egg production, the Kuroiler clearly has the advantage in time and value.

A. Potential Scale of Adoption

These profitability calculations are based on the assumption that prices remain at current levels and that the demand trend continues upward. According to the Ministry of Agriculture, Uganda has 44.7 million chickens, 85 percent of which (38 million) are in the hands of smallholders who raise 20 chickens each on average. Hence, about 2 million households are raising chickens in Uganda. At the current rate of production, which might be overstated because it is not constant, it would take 20 years to supply every fowl-raising household in the country with *exclusively* Kuroiler chickens on a 1:1 basis. However, in the hypothetical situation where 25 percent of the birds are raised for meat, 10 million roosters would need to be supplied every five months to keep the stock constant, which would leave 30 million hens to be produced every 17 months. These estimations result in an annual production figure of 50 million chicks, which is the improbable upper limit.

A more reasonable approach to estimating the potential market for Kuroilers would be to assume that it would consist of a smaller percentage of farmers corresponding to those with some experience in marketing and selling livestock. A 2016 study for the World Bank on rural households' incomes found, on the basis of survey data, that this percentage is about 30 percent in Uganda.⁷⁸ If one-third of those adopted Kuroilers (10 percent of the total poultry-raising population, or 200,000 households), a reasonable level of scaling could be assumed to have been reached already, discounting replacement, if each household took 10 birds per year, pending further development of small-scale agriculture. In this case, scale could be achieved in only two years at the current levels of production.

However, the problem is that this is a supply-side approach, and demand is what is relevant here: the ability of the poultry-products market to absorb the higher levels of output assumed by the promoters of Kuroilers and suggested by the pilot survey. Studies of market potential either have not taken place or are not available, and it is unclear if the promoters of Kuroilers in Uganda had set targets for scaling, taking into account such survey data.

⁷⁷ UBOS *op. cit.*

⁷⁸ Anderson, J. et al, *op. cit.*

TABLE 10: UGANDA TRADE IN CHICKENS AND EGGS (USD THOUSANDS)

Category	ITC #	2010	2011	2012	2013	4-year average
Exports						
Live Chickens	0105.94	143	436	386	77	260.5
Chicken eggs for consumption	0407.21	2308	111	85	15	629.75
Total Value		2451	547	471	92	890.25
<i>Note: Chicken eggs for incubation</i>						
	0407.11					
Imports						
Live Chickens	0105.94	2486	1750	1798	1719	1938.25
Chicken eggs for consumption	0407.21	178	45	61	198	120.5
Total Value		2664	1795	1859	1917	2,058.75
Net Trade (X-M)						
Live Chickens	0105.94	-2343	-1314	-1412	-1642	-1,677.8
Chicken eggs for consumption	0407.21	2130	66	24	-183	509.25
Total Value		-213	-1248	-1388	-1825	-1,168.5

Source: FAOSTAT, <http://faostat.fao.org/beta/en/#data>

A crude estimate of the domestic market absorption potential could be derived from assuming that it includes all imports of poultry meat and live birds, less exports to neighboring countries. However, the value over the last few years has been about \$1.5 million, the equivalent of about 300,000 birds. (At 10 birds per farm household, this would be around 30,000 farmers). Given that Kuroilers are almost twice as productive as domestic birds, a switch of even a small percentage (0.5 percent) of the 44 million local birds to Kuroilers could quickly reach that level. While the ceiling is probably much higher given the prospects for own consumption and increased urban consumption, in fact 2 million have been sold to date (i.e., around 10 percent).

There appears to be a significant risk of downward pressure on meat prices. The same is true for eggs. At the time of the review, demand for eggs was high in South Sudan and provincial towns as supplies for the latter were being brought in from commercial growers in Kampala. However, with renewed fighting across the border, the South Sudanese market once again closed in July 2016.

V. THE EXTERNAL CONTEXT OR SPACES

The external environment includes the policy space in which the innovation is introduced and the regulatory environment that governs its distribution. The supply chain covers the means by which Kuroilers were produced and distributed. In Uganda, the operations of the informal private sector are particularly important. Partnerships and organizational capacity were especially relevant in Uganda because of the roles of ASU, NAGRC, and Chick Masters.

A. Policy Space

Every level of government in Uganda has recognized the potential for poultry to contribute significantly to the economy and poverty reduction. The second National Development Plan recognizes that “to enhance the (agricultural) sector’s contribution to wealth and job creation, there is need to address the critical gaps in production, transport, post-harvest handling, processing, and marketing of agricultural

products so as to maximize the benefits from the agriculture value chains.”⁷⁹ These matters are partially addressed in the Development Strategy and Investment Plan of the MAAIF, described in Section III, footnote 42.

The contribution of poultry to this strategy is outlined in the Rural Poultry Development Project (RPDP), articulated in 2015 as part of the Second National Development Plan, but its Phase I was originally outlined by the MAAIF and ASU in 2011 at the launch of the Kuroiler project: “The RPDP Phase II project is looking to: a) increase the availability of eggs and meat for household consumption; b) increase family revenue by enabling families to sell surplus poultry eggs and meat; c) establish a financially self-sustaining Kuroiler distribution system that will create entrepreneurial opportunities for villagers, and d) by increasing production of the family flock, promote gender equality and raise the social status of the woman of the household.”⁸⁰ In essence, this policy describes the rationale behind the national Kuroiler strategy that received its initial impetus from the enthusiasm of former Minister of Agriculture Hope Mwesigye and its implementation through the resources of NAGRC, which is the government agency responsible for researching and introducing new strains of livestock in Uganda.

The review team found the level of public commitment to the Kuroiler program to be high, although coordination between the different levels of government was substantially lacking.

B. Production and Supply of Chicks

As the supply chain operates in India, where Kuroilers originated, Keggfarms is at the top as the owner of the intellectual property, maintaining the grandparent and parent stock. Eggs and/or DOCs are supplied to MUs that keep the birds for three or four weeks before selling them to dealers, to itinerant traders, or to farmers directly for the production of cocks for meat and hens for eggs. Since Keggfarms developed the Kuroiler, the company retains control of the grandparents’ flock, preventing any breeding of Kuroilers outside the proprietary chain. This makes sense both from commercial and quality control points of view.

In Uganda, the same structure was envisaged at the launch of the Kuroiler program in November 2011, with one significant difference: the grandparent stock would be retained by Keggfarms in India and only the breeding parents would be supplied to Uganda. While this system guaranteed a measure of quality control, it also denied Ugandan entities the possibility of creating their own supply chain from start to finish. This arrangement limited the flexibility of Ugandan partners to increase or decrease Kuroiler parent-stock production according to demand, and restricted their control over the prices, as parent stock accounts for 20 to 25 percent of production costs.⁸¹

As discussed, farmers traditionally breed from their own flocks of local birds and seek to purchase chicks only for new exotic varieties or when they decide to branch out into layers or broilers. The assumption, which has not been scientifically tested nationwide, is that they do this only when they are already considering raising chickens commercially. Rural hatcheries are rare — especially since such units depend on reliable power supplies — and are small, generally catering to farmers who are unable to rely on the natural brooding instincts of their hens, which can result from an abundance of eggs, a shortage of space for brooding, or death of the mother hen from predators or disease. They therefore incubate farmers’ own eggs, rather than those from commercial sources, such as Kuroilers. Indeed, the

⁷⁹ Government of Uganda (2015), *Second National Development Plan (NDP II): Uganda Vision 2040 “A Transformed Ugandan Society from a Peasant to a Modern and Prosperous Country Within 30 Years,”* Kampala.

⁸⁰ Interview, Director, RPDP, Entebbe, May 31, 2016.

⁸¹ Wellspring Development *ibid*.

Kuroiler project is the first to attempt to distribute commercially produced DOCs to rural households and urban family farmers.

Farmers also need to be able to access quality veterinary supplies in the right conditions and, in the absence of thermostable vaccines, with proper attention to the cold chain, as well as to high-quality, unadulterated feed. In Uganda, none of these are givens. Neither the public authorities nor the private partners has the capacity to train two million rural farmers, the veterinary supply system is under-regulated and notoriously unreliable, the cold chain is difficult to maintain in conditions of irregular power supplies and shortages of hermetic containers, and adulterated poultry feed is a growth industry. All of these factors have implications for raising a breed of chickens that requires high-quality feed, lifelong veterinary supervision, and regular vaccinations.

C. The Informal Sector and Quality Control

As discussed, one result of Kuroiler scaling has been an explosion of counterfeiting, whether deliberate or not. This makes the regulatory and enforcement context for fighting fraud quite relevant. Uganda relies on its Control of Agro-Chemical Act, Seed and Plant Act, and Plant Protection Act. These are enforced by the Department of Crop Protection within the Ministry of Agriculture. Unfortunately, enforcement of the acts is quite weak. Uganda's Animal Breeding Act of 2001, among other things, aims to "provide for the promotion, regulation and control, marketing, import and export, and quality assurance of animal and fish genetic materials and generally to provide for the implementation of the national breeding policy in Uganda." It also provides for penalties for selling of substandard material. However, no equivalent to the Department of Crop Protection exists on the animal side. According to the International Growth Center, an operation of the London School of Economics and Oxford University, "agricultural inputs sold at retail level in Uganda are often 'fake' or of very poor quality."⁸² This description applies not only to Container Village in Kampala, the center for input sales, but also to the district and regional centers where stores are supplied from Kampala, often by informal minibus routes or itinerant traders.

In fact, the situation is so worrisome that the government has created a special police force, the Agricultural Police, attached to the MAAIF. A Commissioner of Police leads the unit and controls three divisions: crops, livestock, and fisheries. The commissioner told the review team: "Counterfeit inputs are failing farmers to increase agricultural productivity. Besides, these counterfeits are dangerous to our lives. ... In Uganda alone, between 25 and 30 percent of agrochemicals are counterfeit and sub-standard."⁸³ Such a situation also impacts poultry supplies, both at the level of chick supplies and inputs such as feed and pharmaceuticals. Since it is impossible to distinguish real Kuroiler DOCs from fakes and counterfeits, the Agricultural Police need to enforce the use of the brand name so that only NAGRC, Chick Masters, and accredited MUs can legally market Kuroilers.

To the best of the review team's knowledge, no private sector associations have attempted to undertake quality control for animal breeds. FTF, the U.K.'s Department for International Development, and others have been supporting quality control efforts in seed certification and other crop inputs.

D. Financial and Fiscal Space

The Kuroiler project relied entirely on funding from BMGF to finance the purchase of initial batches of parent stock from India. The presumption appears to have been that farmers would be able to purchase DOCs or TOCs without strain on family finances because the future profits were so obvious. However,

⁸² <http://www.theigc.org/project/dealing-with-fake-agricultural-inputs/>.

⁸³ Interviewed July 7, 2016.

the financial system in Uganda is undeveloped, particularly regarding the agricultural sector. If farmers needed financing to purchase Kuroiler stock and all other required inputs and fencing, the funding application to BMGF included no provision to support farmers; only to NAGRC and subsequently to Chick Masters. With few exceptions, Kuroilers have been purchased by better-off households with sufficient liquidity to cover the repayment period of several months.

For its part, despite a stated commitment to poultry farming in general and Kuroilers in particular, the GOU has not created a favorable fiscal space through tax breaks or credits, cheap public finance, or any mechanisms to help farmers overcome the initial financial hurdles associated with becoming involved in the Kuroiler project. Moreover, the state has not provided sufficient regulatory or enforcement facilities to protect the burgeoning Kuroiler industry from the effects of fraud and counterfeiting. As a result, the acquisition and raising of Kuroilers has remained generally out of reach of the poorest households.

E. Partnerships and Institutional Capacity

The driving force behind the introduction of Kuroilers to Uganda was Arizona State University (ASU), which was researching the adaptability of Kuroilers to East Africa. ASU, however, could not unilaterally introduce the birds to the Ugandan market and needed a pilot field trial to test the theoretical outcomes observed in the laboratory and compare them to results in India. ASU and the MAAIF formed a partnership to conduct the 2009 pilot study, with NAGRC as the operational public partner. When ASU and the MAAIF decided to proceed with scaling, they formed a relationship with Keggfarms in India. The private partner, Chick Masters, was brought into the partnership only after NAGRC demonstrated the limits of its ability to supply the market. NGOs and other private organizations were not formally involved in the partnership but nonetheless participated as clients for NAGRC and Chick Masters, purchasing DOCs and TOCs for distribution to their projects, which is a role they continue to fulfill.

At the district level, district veterinary officers (DVOs) implement the Kuroiler project in coordination with local MUs and commercial distributors. The DVOs in principle could have been pivotal in training and advising the MUs on the correct management of the system and on extending training and information to end-user farmers. However, the capacity of the districts and their relationship to MAAIF is often weak. This is because both the district and ministry levels have a shortage of resources and personnel, limiting the possibilities for recruiting DVOs, training them, and supplying them with the means to carry out their responsibilities.⁸⁴ Partial devolution in 1990 to the districts was never followed by sufficient transfer of resources and training has not kept up with the needs of a professional cohort of veterinary officers.

In Kampala, the KCCA is responsible for overall control of the implementation of the Kuroiler strategy, acting through the development offices of the constituent municipalities (known as “divisions”). The KCCA officer guiding the Kuroiler program in the capital is also the former technical manager (for production) at NAGRC, who was in charge of implementing the Kuroiler pilot program in 2009. As such, he is particularly knowledgeable about the Kuroiler breed.

In an urban environment, the KCCA had more control over the distribution of the chickens and was in a better position to advise farmers on how to obtain the best results from their flocks. In the countryside, because of the longer distances and the lack of facilities and training, authorities had less

⁸⁴ According to the MAAIF web site (<http://www.agriculture.go.ug/districts>, accessed November 1, 2016): “The reality is that the link between MAAIF HQ and the districts is very weak, exacerbated by the limited numbers of staff. The current MAAIF HQ establishment has a total of 411 positions, out of which only 279 (67 percent) are filled.” Furthermore, “Capacity in these district Production Departments has been negatively affected by a delay in implementation of planned reforms and, over five years now, personnel have either retired or resigned but have not been replaced due to a suspension of recruitment.”

direct contact with farmers raising Kuroiler chickens. In both contexts, a lack of resources prohibited optimal cooperation between the authorities and the end users.

No partners (with the exception of Keggfarms in India) had experience operating a commercial poultry operation on the basis of market research, outreach operatives to educate and train producers, results analysis, viability analysis, or progress monitoring and management. This proved to be a severe limitation on the expansion of the Kuroiler project in Uganda. As a result, although the project stalled when NAGRC's shortcomings became evident, the partners were unable to re-energize the project leading to the withdrawal of BMGF on the grounds that the project could not be viably managed from Arizona and needed a local manager that no partner was prepared to recruit.

F. Incentives

One reason that commercialization and scaling proved problematic appears to be that none of the key driving organizations had a primary incentive to achieve that objective. ASU and its team had strong incentives to conduct research and validate it empirically, and NAGRC had incentives to follow government policy. Chick Masters came in late and still does not have real ownership of the Kuroiler project, as it still depends heavily on NAGRC for the supply of chicks and promotional activities. NGOs and KCCA also perform a promotional role when they encourage take-up in their projects or among the urban poor, respectively.

G. Summary

The external context for Kuroiler chickens in Uganda is far from straightforward. The policy environment clearly favored the introduction of the breed and the private-sector partner is enthusiastically developing his business. However, the value chain and particularly supply were insufficiently developed to permit regular and reliable deliveries of chicks, and the same was true for access to quality vaccines and commercial feed. Similarly, training and extension capacity was quite limited, even if that had been part of the scaling strategy (see below). Public sector quality control was non-existent and the specialized police force charged with tackling counterfeiting and misrepresentation is ill-equipped to do so. Meanwhile, the informal sector is abusing the Kuroiler brand and the long-established practice of unscrupulous marketing of adulterated feed and veterinary supplies continues.

VI. ADOPTION DRIVERS AND RESULTS OVER TIME AND SPACE

A. Scaling Strategy and Activities

In 2009, ASU, NAGRC, and Keggfarms conducted a pilot study involving Kuroiler chickens in Uganda with the intention of comparing local chickens to Kuroilers in five districts under the same conditions. The pilot was the culmination of research at ASU to find a means of introducing a poultry variety to poor communities, with a view to raising nutrition levels and reducing poverty. ASU, which funded the pilot from its own resources, subsequently published the results of the pilot in a research paper.⁸⁵

⁸⁵ <http://www.slideshare.net/LivestockAfrica/the-kuroiler-chicken-as-a-means-of-reducing-poverty-and-providing-nutritional-security-in-uganda>

On the basis of the pilot results and an approach from ASU, the BMGF awarded a grant of USD \$1.4 million to ASU in support of the next phase of the Kuroiler project, namely scaling up Kuroilers in Uganda. The specific objective of this first phase was to implement a commercially viable Kuroiler chick production and distribution system. The broad strategy was to achieve scale by promoting adoption of Kuroilers through multiple media, as well as outreach at the district and local levels. Production and distribution would start with the public sector and then expand to commercial actors as increased quantities were needed.

A key driver of the initial introduction of Kuroiler chickens to Uganda was a visit to India by the Ugandan Minister of Agriculture, Ms. Hope Mwesigye, in early 2010. While in India, Minister Mwesigye studied aspects of India's "green revolution," including the contribution to villagers' livelihoods from Kuroilers. Upon returning to Uganda, Minister Mwesigye pledged support for the Kuroiler project.

Kuroiler chickens were formally introduced to Uganda — and potentially to East Africa as a whole — at a Pan-African Conference on the Launch of the Kuroiler in Uganda in August 2011, hosted by NAGRC with participation from ASU, MAAIF, Keggfarms, the NAADS, and the International Network for Family Poultry Development (INFPD). The conference demonstrated the alliance between ASU and the government to support introduction of the breed. This commitment of the parties was important for the credibility of the project, both to the local population and to potential funding agencies, including BMGF.

ASU and NAGRC assumed responsibility for implementing this phase. ASU was the primary conduit for funding and provided technical assistance and general oversight. The responsibilities for implementation largely fell to NAGRC, which conducted national media campaigns, engaged district officers to promote Kuroilers, and began breeding chicks and providing them for sale. NAGRC and ASU joined forces to promote the establishment of MUs, with a specific focus on engaging rural women in their operation.

The pilot study and original scaling strategy had a number of blind spots:

1. A human-centered design approach of feasibility, desirability, and usability was not conducted. This resulted in a failure to recognize that successful scaling required combining the chickens into a package with poultry management techniques appropriate to the breed, including vaccination, supplemental feeding, and adaptation of the locale, that differed from those used for local chickens. This proved to be quite problematic. Derivatively, the scaling strategy did not include a component to provide training or extension services in management, how to market surplus poultry products, or the differences in raising Kuroilers (e.g., that they are hybrids and cannot be bred with each other or local chickens).
2. The pilot study did not include analysis of the poultry value chain. It was assumed that the value chain would function much as it does in India, with profitability along its length. No analysis of the business case for commercial chick breeders or nurseries (MUs) was conducted, nor examination of whether farmers would find it profitable to buy DOCs vs. TOCs. This time dimension was a particularly important oversight, as it also ignored the fact that farmers expected to breed Kuroilers once they had bought their initial flock. The consequence of this oversight was that the strategy missed the need for local, timely access to vaccinations, veterinary services, and new chicks. It missed the importance of addressing how to maintain quality and certified Kuroilers in a system plagued by counterfeit products in many agricultural inputs, with little capacity to control them.
3. The effort lacked awareness of the potential market size and a means of absorbing increased production and sales of surplus meat and eggs into a highly segmented market, where the connections between local markets and secondary or urban markets were thin and characterized by high transaction costs.

Phase I

In the period between the November 2011 conference and the first distribution of DOCs, ASU and NAGRC promoted the new breed and, most importantly, used their own resources for a series of regional workshops to promote the creation of MUs and encourage rural women to become MU operators. NAGRC also used this period and some funding that BMGF provided to ASU to upgrade its facilities in Entebbe, allowing it to house and care for up to 12,000 laying chickens and their attendant roosters. The institution signed a feed-supply agreement with a parastatal firm in anticipation of the parent stock. However, NAGRC hired only two new permanent staff: a head of production and a head of marketing. The involvement of NAGRC, with its reputation as a center of excellence and genetic research in Uganda, was important to establish the credibility of Kuroilers among rural communities. In addition, NAGRC promoted Kuroilers through workshops and presentations to women's empowerment groups throughout the country and helped establish MUs.

Actual implementation of the project started in August 2012 with funding from BMGF and support from the MAAIF for the importation of parent stock from India. Keggfarms agreed to provide parent stock so NAGRC could supply either DOCs or, preferably, TOCs to local farming families and small-scale commercial producers, which were the targets of the project as part of the partners' interest in poverty reduction. The first consignment arrived in Entebbe on April 30, 2013, and another 18 months later. Full-scale production and distribution of DOCs began in January 2014 at NAGRC's Entebbe site. According to ASU, by the end of 2014, rural farmers in Uganda had bought nearly a half-million Kuroilers from the MUs that purchased DOCs from NAGRC in Entebbe.⁸⁶ In the first year of the project, around 33,800 rural Ugandan families received the Kuroiler chickens.⁸⁷ It is not clear, however, how this initial production was distributed, even if it appears that about half of them went to MUs. The most likely explanation from interviews is that purchasers made the journey to Entebbe themselves and carried chicks home on public transportation. This would indicate that purchasers — whether MUs or not — would not be the poorest households and that there was a bias toward better-off farmers. The failure to consider having a transportation strategy in place could have had an impact on the economic profile of the beneficiaries of the Kuroiler project.

To support the Kuroiler initiative, the government and the partners in the Kuroiler project engaged in “a marketing program (mostly through radio but also through the state extension and veterinary services).”⁸⁸ Indeed, the review team found people aware and somewhat knowledgeable about Kuroilers throughout the country; the most common question was “Where can we get them?” Advertising of these miracle chickens by NAGRC led to an explosion of demand for Kuroiler chicks that was unanticipated, as no market study had been done. In fact, the marketing has been characterized as *too* effective, “The Kuroiler project in Uganda went too fast, without proper consultation and understanding of the ecological system in the districts of Apac, Wakiso, Gulu, and Mayuge. The farmers are not aware of the physical appearance of the birds and cannot distinguish them from, for example, the ‘Kenbro’ from Kenya or the new ‘Rainbow’ breed.”⁸⁹ Nonetheless, the information campaign successfully raised awareness and stimulated demand.

ASU and BMGF agreed in late 2013 that the government facility at NAGRC was not meeting increased demand. In fact, there seems to have been little oversight of NAGRC's commercial strategy, as indicated by its ordering only two batches of chicks in four years, and there were no commercial distribution guidelines agreed on by the partners, nor a future strategy for increasing supply.

⁸⁶ <http://clippings.ilri.org/2015/02/13/uganda-chicken-project-inspires-bigger-plan-to-improve-africas-chicken-breeds/>

⁸⁷ <https://asunow.asu.edu/content/chicken-and-egg-question-and-answer-rural-uganda>

⁸⁸ Communication from former Gates Foundation officer, June 15, 2016.

⁸⁹ Interview, Lira Local Government Production and Marketing Officer, June 22, 2016.

Phase II – Private Sector Involvement

In Phase II, ASU and BMGF decided that a private producer could be expected to expand supply to meet the unanticipated excess demand. This took the form of a parallel production system alongside NAGRC. The private partner, whose initial purchases of stock were also funded by BMGF through ASU, was expected to take a more business-like approach to the operation and would be able to continue without further funding, once profits from the sale of Kuroilers began to accumulate.

ASU chose Chick Masters because of its experience in poultry production and its willingness to expand into Kuroilers with support from ASU and BMGF⁹⁰ to cover the initial purchase of parent stock and some training of staff in the company and in MUs. In addition, Chick Masters was able to provide significant under-utilized capacity. Other potential candidates were not selected because they either did not wish to be considered or were unwilling to commit to the long-term operation of the project. Chick Masters already had substantial production capacity and was willing to convert it to Kuroiler production. In addition, the company was already planning to expand its facilities and applied the expansion to Kuroilers. It was also located close to Kampala. However, no distribution system was built for Chick Masters, either, so even though this central location was an advantage, purchasers still had to arrange transport of the chicks.

The attraction for the private company was the proven excess demand and a ready market, so the company did not have to do any marketing. In retrospect, this was problematic because acting only as a producer meant that the private company did not assume full ownership of the Kuroiler product. It left responsibility for marketing, certification and training, and technical support for farmers largely to NAGRC and ASU, although it does provide information packs with sales on demand.

Chick Masters received supplies from Keggfarms the same way NAGRC had, but benefited from ownership of three parent farms to raise FI Kuroiler chickens. Chick Masters received its first batch of parent male DOCs and fertilized eggs at the beginning of February 2015. The company began producing Kuroiler DOCs five months later. By June 2016, the company had received four shipments of parent stock from India and was expecting another in August 2016.⁹¹

Chick Masters' capacity is higher than NAGRC's; as a private enterprise, its activity is more flexible. For example, Chick Masters does not limit its sales to MUs; it also exports DOCs to neighboring countries and does "ad-hoc" doorstep sales to passing customers. Chick Masters tries to provide training to customers, by either written material or direct counselling, but this practice is clearly not universal and customers can purchase DOCs and remove them from the premises without any training at all. The firm works with approximately 60 MUs throughout Uganda,⁹² using either public transportation for the DOCs or providing them to customers who arrange their own transport. In either case, the purchaser bears the cost of transport. The bulk of production passed to Chick Masters, while NAGRC continued to market Kuroilers and support awareness-building efforts by local government agents.

Close to its Mukono headquarters, the company operates three farms where it has installed parent stock and they have a cumulative capacity to produce 160,000 DOCs per month, which is equal to twice the number at NAGRC. Together, the partners can theoretically produce 2.88 million DOCs annually at maximum output. However, the mortality and general loss rate is still quite high and a more realistic

⁹⁰A grant of USD \$1.4 million (equal to the start-up grant for NAGRC) from the Bill and Melinda Gates Foundation, although the grant period, after a short extension, was due to run out in August 2016. Interview, Chick Masters Ltd., June 24, 2016.

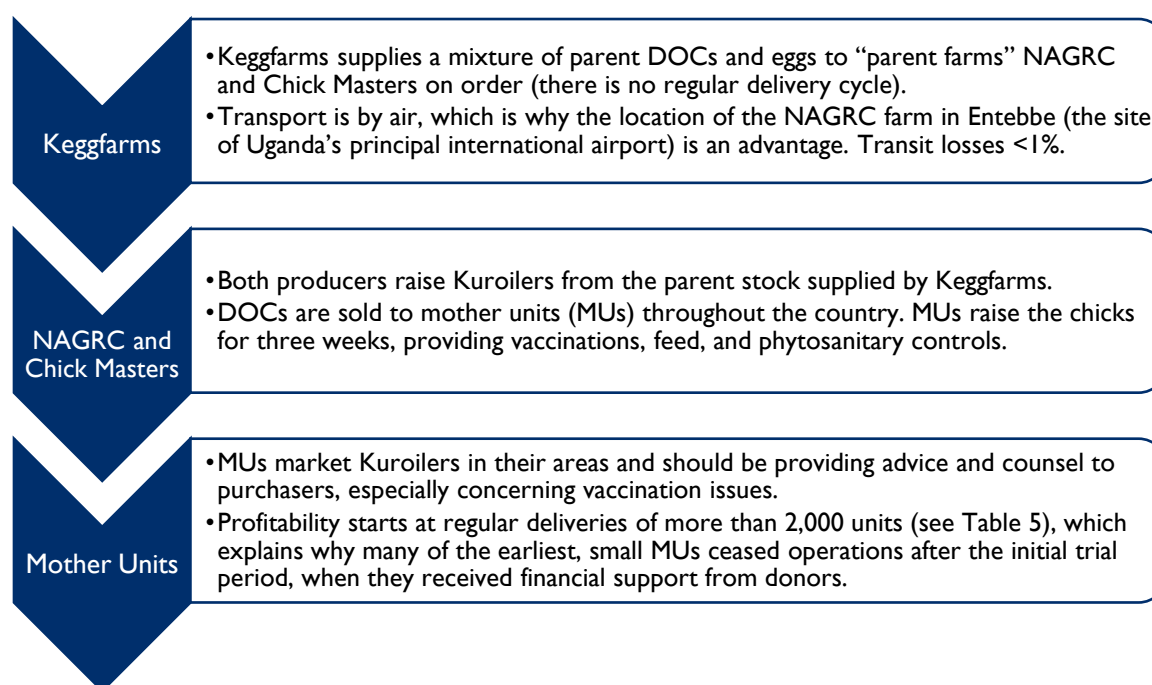
⁹¹ Confirmed by Keggfarms in communication, June 30, 2016.

⁹² An unpublished private review of the Kuroiler project, however, advances the figure of 72 MUs working with Chick Masters, which would bring the total to more than 80. This information could not be independently verified.

figure would be 2.3 million per year.⁹³ To complicate things further, demand for DOCs also fluctuates, peaking four months prior to the holiday seasons of Christmas, Easter, Eid-el-Fitr and Fitra (Muslim new year), when customer demand for large, high-quality fowl is at a maximum. At such times, according to Chick Masters, neither producer is able to satisfy demand, further opening the door to fakes and counterfeits.⁹⁴

As part of its agreement with ASU and BMGF, Chick Masters also became responsible for establishing MUs throughout the country. In fact, it was always in the company's interest to do so, since the most effective way to sell its production is through bulk purchases of the MUs. ASU provided promotional materials to support the MU strategy and the company has successfully helped establish 60 MUs. However, there is no future support for MUs in perspective and money for training purposes provided through ASU by BMGF was limited to the first one or two batches of chicks handled by the new MUs.

FIGURE 1: UGANDAN KUROIILER SUPPLY CHAIN



B. Outcomes and Problems with Scaling

In principle, the result of the scaling effort was to establish three sources of Kuroiler chickens for end users in Uganda: local MUs, NAGRC, and the private company Chick Masters. Unlike the model system developed in India, there are no “last-mile” itinerant traders in DOCs serving the poorest, most remote communities, perhaps because of low profitability. It would appear that the “exclusivity” model was preferred from the beginning, following the pilot study, and NAGRC was expected to be the sole supplier for the country. However, there is no certification system, no “branding” as such, and hence absolutely no way to identify a Kuroiler stock DOC from any other breed of DOC. Presumably, the idea was to rely on the sole-supplier principle so that, “If it’s not from NAGRC (or, later, Chick Masters), it’s not a Kuroiler.” This message, unfortunately, does not appear to have been widely diffused

⁹³ Calculated from information provided by NAGRC and Chick Masters.

⁹⁴ Interview, Chick Masters Ltd., June 24, 2016.

and has certainly not been understood, which is partly the reason for the massive fraud observed by the review team (see previous section).

In May and June 2016, NAGRC and Chick Masters were importing live cocks and quantities of eggs to produce females from Keggfarms in India at a ratio of 600 cocks to 15,000 eggs.⁹⁵ The private partner was producing roughly twice as many DOCs as NAGRC and was planning to increase production further. According to the GOU, in fiscal year (FY) 2014–15 (July to June),⁹⁶ 221,866 Kuroiler chicks were produced, which indicates a slowing of production in the second half of the year.⁹⁷ A new parent stock of 15,000 birds (15,000 eggs and 600 male DOCs) had been procured and received by NAGRC in October 2014. Hatching of the eggs in Entebbe — then the country’s only hatching site — began by April 2015. In principle, at the full rate of production, the flock held at NAGRC would be capable of producing 80,000 DOCs per month, or almost 1 million chicks per year.

Supply Chain Results and Challenges

Current production levels are well below demand. Whether this excess demand is sustainable is open to question, given many farmers’ negative experiences and the fact that the potential to absorb increased production may be limited. Much of this appears to be due to delays in NAGRC and Chick Master being able to increase their flocks. For example, during FY 2013–14, NAGRC maintained a flock (3,000 laying birds and 290 males) that had grown old and needed replacement. NAGRC did not order the next batch of parent stock from Keggfarms until July 2016, over 20 months after the previous batch,⁹⁸ when production would have been on the decline or (more likely) ceased; Kuroilers’ laying cycle is 17 months maximum.⁹⁹ Since then, NAGRC has maintained its capacity of 80,000 DOCs per month.¹⁰⁰ The promoters had assumed that NAGRC would be able to fund its own operations from profits after an initial funding effort from BMGF and the ministry. This, however, does not seem to have been the case and the profits from sales were not held and earmarked for new stock, which explains the delays before ordering new consignments.

The Kuroiler project seems to have been based on the assumption that the breed was so advantageous that it would “sell itself” and promotional activities carried out by ASU and NAGRC were limited to raising awareness. The supply chain was neglected because the MUs represented the only link between the producers and end-user farmers, and the promoters assumed that the MU operators would build their own customer base in cooperation with local CVOs and CPOs. But the MU operators were not equipped to build a clientele and local officials were not trained to help them — and they were handicapped by the chronic lack of resources. Meanwhile, no attention was paid to certification or branding, which enabled the informal sector to rapidly exploit an opening to satisfy excess demand with fake or inbred Kuroilers.

According to Chick Masters, the company is making substantial profits from its Kuroiler business. Indeed, when the review team spoke with the company’s management in late June, the funding from the BMGF via ASU had expired and operations were continuing on the basis of normal business practices. The review team was unable to verify this claim independently, but there is some suggestion from BMGF

⁹⁵ Data provided by NAGRC, September 2016. The same system of live chicks and eggs is still in operation.

⁹⁶ Apparent inconsistencies are due to the lack of alignment of the fiscal year with the calendar year. Government economic reports tend to be based on the former, while commercial production and targets use the latter.

⁹⁷ <http://www.finance.go.ug/dmdocuments/Agriculture%20Sector%20-%20Annual%20Monitoring%20Report.pdf>

⁹⁸ Communication from Keggfarms, July 1, 2016.

⁹⁹ In May 2016, the review team visited NAGRC and learned that the Kuroiler unit was operating at only 65 percent capacity.

¹⁰⁰ Communication from NAGRC, October 6, 2016. However, unconfirmed reports suggest that production fluctuates between the maximum of 80,000 birds and as low as 32,000 units per month.

that a large part of Chick Masters' initial production went to an FAO-funded operation with a limited time span, which suggests that the market would decline when the FAO project terminated at the end of 2016. However, at least a part of Chick Masters' clientele is from beyond Uganda's borders and this may counterbalance any decline in the local market, although it is impossible to estimate the level of sustainability of this international business.¹⁰¹

Chick Masters has actively supported the establishment of MUs across the country, a process facilitated to some extent by the promise of funding from the BMGF for start-up businesses. They claim that their efforts have resulted in the creation of 50 MUs to add to the 20 or so that had been established by NAGRC and ASU since 2012. Interviews with managers of present MUs and MUs that have gone out of business indicate that, as Table 6 illustrates, profitability is difficult to achieve with small quantities of birds. In addition, the operators of MUs "would greatly benefit from more business training to better manage their operating costs (e.g., optimizing delivery routes, mixing their own feed)."¹⁰² Funding from the donor subsidized some training of MUs, but that ceased after the first batch or two of chicks. There appears not to be a regular contractual relationship between the suppliers and the MUs; the latter orders stock only when they see fit. For some, this means they order only in time for major poultry-consuming festivals like Christmas. For others, operating an MU is merely a side business to which they pay only marginal attention. Hence the structures supporting the MU system are weak and they receive little advice or mentoring.

The viability of all of these MUs remains to be seen, especially (as noted earlier in this report) because some early MUs have gone out of business. The total of 70 MUs across the nation cited by the promoters, and included on that basis in this report, does not appear to take into account those that have exited the business.

Farmers' Experience

Kuroilers need much more care and attention, so much that some early adopters have abandoned them and gone back to only local birds. The hidden costs associated with Kuroilers have had a negative effect on demand. Highest among these hidden costs is the price of veterinary supplies, without which the Kuroiler is extremely susceptible to disease. The price is so high that some farmers decide to dispense with vaccination altogether, especially since it is not a traditional practice, but they do so at their own risk.¹⁰³ Many farmers have realized they will get the best out of their Kuroiler flocks only if they give them supplementary feed. Some are able to mix feed themselves from their own produce,¹⁰⁴ but most depend on markets where the quality of the supplies is open to question. Feed on the open market can be so adulterated that it makes birds sick or kills them, yet remains openly for sale.¹⁰⁵

These factors have affected the profitability of raising Kuroilers. These chickens fetch a better price for meat at certain times of the year, but the price difference¹⁰⁶ is not enough to make raising them

¹⁰¹ One of the challenges in the scaling-up process is that Chick Masters and some MUs are selling Kuroiler chicks to nearby countries, widening the gap between domestic demand and supply. According to Chick Masters, this side of the business is developing rapidly, particularly with Kenya, where DOC prices make it economical to drive almost to Kampala to purchase them to bring back over the border.

¹⁰² Commentary from former Gates Foundation officer responsible for the Kuroiler program.

¹⁰³ Otim's Poultry Farm, which the review team visited June 22, 2016, was only one of many that reported losing large numbers of Kuroilers to disease. In their case, the entire flock was virtually wiped out twice.

¹⁰⁴ For example, a commercial farmer in Lira recounted how he had learned through trial and error to produce his own feed from bran he bought and corn he grew.

¹⁰⁵ Testimony, USAID agronomist, Kampala, May 31, 2016.

¹⁰⁶ Initially, when Kuroilers were rare, the market price could rise to UGX 30,000, compared to UGX 19,000 for local birds, but prices for Kuroilers have almost aligned with the local birds of the same weight at UGX 20,000.

worthwhile, once the farmers understand that to get the maximum from their flocks they need to renew stock by purchasing TOCs, provide a fenced compound to raise them, and invest in considerable expense for medicines and veterinary care. These factors, as noted, limit medium- or long-term participation in the Kuroiler project to households with the greatest financial flexibility through higher incomes, increased accumulated wealth or access to financial products.

Counterfeiting and Fraud

As noted, the introduction of Kuroiler chickens after the “launch” in 2011 was followed by extensive marketing, especially through the medium of radio. As a result, demand for the new chickens rose very quickly at a time when the official supplier — NAGRC — was unable to meet demand. The increase in production from the partnership with Chick Masters after mid-2015 did little to satisfy that demand. As a result, the informal sector began to supply the market with counterfeit Kuroilers in large quantities.¹⁰⁷ These chickens turned out to be hybrids imported from Kenya or simply large local chickens. One “supplier” even had a website to market the new breed; the Agriculture Police eventually closed it down. Another continues to operate her “Kuroiler hatchery” just outside Kampala with a website and “training sessions,” selling fake birds to Ugandans and abroad. In Container Village in Kampala, at least a dozen “Kuroiler” suppliers were in operation during a review carried out for this report in July 2016. Some of these operations are based on dishonesty, some on ignorance, and some on misunderstanding. Some suppliers claimed they had themselves been deceived when they purchased birds from people purporting to be marketing genuine Kuroilers.

Some farmers, instead of abandoning Kuroilers, are also breeding their remaining Kuroilers with local stock to produce a temporary “successful” hybrid. As a result, the number of “fake” Kuroilers derived from FI stock or interbreeding with indigenous poultry is increasing in the countryside. In Apac, for example, “90 percent of those who purchased Kuroiler day-old chicks crossbred the cocks with local hens. In fact, even local officers engaged in this practice, even though they were the ones [who were] supposed to be advising against it.”¹⁰⁸ Knowing that the Kuroiler does not brood, the officers advised farmers who were interbreeding Kuroilers to place the resulting eggs under local birds to hatch “new Kuroilers.”

In both Kampala and the countryside, the review team encountered a generalized pattern of cross-breeding and inbreeding that resulted in improperly bred Kuroilers that were then sold on the market either as breeding stock or as DOCs. In almost every interview, farmers told the review team that they had either retained the cocks or sold them “for breeding,” despite the general advice from NAGRC and Chick Masters that this was a bad idea. In fact, the belief that breeding from Kuroilers was possible and desirable extended to officials who were expected to provide training to the contrary.¹⁰⁹ As a result, in the opinion of an official who has extensive knowledge of the Kuroiler project, “probably over 90 percent of the chickens said to be ‘Kuroilers’ in Uganda are fakes, either as counterfeits or as the result of cross- or inbreeding.”¹¹⁰

Although it is impossible to arrive at an exact figure for demand without a special study, anecdotal evidence collected by the review team in the countryside suggests that demand for genuine Kuroilers is no longer steeply increasing. Disappointing performance, unexpectedly high production costs, and market resistance have made the breed much less attractive to farmers than early promotional activities had suggested. The presence in the market of fake and counterfeit Kuroilers further damages the

¹⁰⁷ Interviews, KCCA, May 30, 2016, NAGRC, May 31, 2016, Sports Outreach Ministry, Gulu, June 30, among others.

¹⁰⁸ Interviews, Apac District Veterinary Office, June 22, 2016

¹⁰⁹ Interviews with Gulu and Apac veterinary officials.

¹¹⁰ Interview, KCCA, May 30, 2016.

reputation of the genuine article, since farmers cannot distinguish between the varieties of DOCs. These factors combine to jeopardize the scaling of Kuroilers in Uganda.

VII. OVERALL CONCLUSIONS

The low productivity of poultry in Uganda has been identified as an area of potential growth that could lead to poverty reduction and better, healthier lives. With the documented experience with Kuroilers in India and the fowl's high productivity, the breed could unlock the potential of the small-scale poultry sector, provided losses from preventable diseases could be reduced, adequate and affordable quality feed is available, qualified veterinary support is widespread, farmer education is enhanced, and a functioning market system is established. The promoters imagined that a similar value chain to the one in India could be established in Uganda, creating links in the supply chain where profits could be distributed.¹¹¹ The experience with scaling Kuroilers has been at best a mixed success. Successful marketing created an explosion of demand for the breed that supply could not meet, which led to the proliferation of fakes. Counterfeiting, combined with a failure to properly train or inform farmers on the correct management required for Kuroilers, led to a disappointing experience for many farmers. It is too soon to tell what the ultimate outcome is for the Kuroiler case, but there are several lessons to be learned.

A. Characteristics of the Innovation

Kuroiler chickens probably had game-changing potential in rural Uganda and in the urban periphery of Kampala if the right package had been feasible to introduce and scale. The fowl's demonstrably higher productivity and potential both to raise incomes and improve nutrition levels makes its adoption by poultry farmers an attractive proposition. However, its greater complexity, phytosanitary requirements, and specific marketing meant the package of innovations needed to include training and follow-up support. Even with training, adopters need to have the ability to market their poultry and eggs. This is a prime example of the innovative technology needing to be embedded in a larger package of innovations and support.

B. Adoption Drivers and Results over Time and Space

Policy was an important driver of scaling in Uganda, including creating a champion in the Minister of Agriculture following her visit to India. Improving the productivity of Uganda's smallholder poultry flocks was an identified route out of poverty and improved nutrition and aligned with the country's overall poverty reduction and agricultural development strategies.

Agricultural research was a major driver of scaling Kuroilers in Uganda. A scientifically sound pilot study demonstrated the *potential* for Kuroiler chickens to adapt to the Ugandan environment and raise income and nutrition levels by generalizing access to high-quality, prolific birds.

Promotional campaigns by public authorities and subsequently by the private operator significantly raised awareness of the innovation and stimulated demand for it. Promotional campaigns need to include all of the information about management challenges and the costs involved, not just that Kuroilers are a

¹¹¹ Semambo, D.K, et al, (2011), *The Kuroiler Chicken as a Means of Reducing Poverty and Providing Nutritional Security in Uganda*, presentation to the Pan African Launch of the Kuroiler Chicken in Uganda, November 2011. See, in particular, "Kuroiler Distribution System for Rural Uganda."

“miracle” bird. A missing driver in the Kuroilers case was commercialization research on the market for Kuroilers, including potential challenges in feasibility, usability, and financing.

Research institutions were the organizational drivers of scaling Kuroilers in Uganda, yet these entities were in principle pursuing a commercialization strategy. This created distortions not only in their capacity, but in incentives and their predisposition to ask the right questions, let alone answer them.

C. Business Case for the Innovation

The Kuroilers case shows that the business case has to work for all actors in the value chain, and this has to be defined as beyond simple rates of return to include risks and affordability. However, this was not the case. It appears that NAGRC was not able to fund the increased purchases of chicks it needed, probably because the income from sales reverted to the government’s general fund. While Kuroilers could be quite profitable, the extra demand on women’s labor, higher investment costs, hybrid characteristics, and risks of high mortality rates appears to have made it difficult for many smaller farmers to adopt use of the birds sustainably. Similarly, it appears that MUs have had financial difficulties. To date, the only actor that has proven profitable has been Chick Masters.

D. The Context, Value Chain and Market System

Uganda was a favorable place to scale Kuroilers, given the widespread ownership of local poultry and growing demand for poultry products, including exports. However, several factors made this a difficult environment to scale in, including:

- The lack of a developed chick production industry and limited distribution system;
- The small level of commercial poultry production with the necessary management skills, who might have proven better as early adopters (i.e., trickle-down from commercial to small farmers);
- Widespread existence of fraud and counterfeit agricultural inputs with no effective enforcement of laws and regulations, including animal breeds;
- Lack of sufficiently qualified and widespread veterinary support services; and
- Lack of linkages between local village markets and secondary/urban markets that could serve as a source of demand.

Alignment with public policies and specific strategies can facilitate scaling, especially when embodied in a champion like the Minister of Agriculture. However, it is less clear from the Ugandan case whether that support can be a primary driver of a *commercial* scaling strategy, or where the state or parastatal is not driven at least partly by commercial considerations.

For innovations that require training and extension support on the ground, having a strong public extension system (or its private equivalent) in place is necessary. Uganda had neither, and the capacity, resources, and level of training of district officials failed to meet the needs to enable them to complete their missions and may have contributed to errors such as inbreeding and crossbreeding of Kuroilers.

E. Scaling Strategy

The involvement of the BMGF was essential to establishing the Kuroiler in Uganda. Alongside ASU, the foundation first supported NAGRC’s purchase of the initial batch of Kuroiler parent chicks and then Chick Masters’ acquisition of stocks from Keggfarms. The pilot study, followed by the 2011 launch and an intensive promotional campaign, brought Kuroilers to the attention of the Ugandan public, in both

the rural areas and Kampala. Phase II of the program brought private sector involvement in the form of Chick Masters.

Scaling strategies need to go beyond demand promotion and increased supply. The promotional campaign was for an improved variety without any obvious attention to other aspects of scaling:

1) establishing an estimate of demand, 2) selecting early adopters for their manifest ability to adapt to the new breed, 3) ensuring an adequate and secure supply of veterinary products, 4) creating a marketing strategy for the final product, and 5) preparing for the likelihood of copies and fakes. The “commercial pathway” that represented the arrival of the private partner could be seen as an attempt to correct the failure of the public partner to distribute the innovation adequately.

Scaling strategies need to be based on more than agricultural research, including an assessment of the market, feasibility and usability by potential adopters, and the ability of the value chain both upstream and downstream. In cases where the innovations in the package are complex and represent a substantial departure from existing practices, the scaling strategy needs to include training and extension services. Those differences need to be included in any promotional and marketing efforts. Where multiple weaknesses exist in the value chain — input supply, distribution, quality control, and market linkages — scaling strategies need to address those weaknesses. Perhaps most importantly, scaling strategies need to include management and implementation by organizations with the necessary commercialization skills, incentives and philosophy.

F. Overall Conclusions

Chapter 7 of the Ugandan government’s RPDP under *Kuroiler and Indigenous Chicken Resource Development*, states, “This is aimed at ensuring indigenous chicken genetics conservation, development, multiplication, and utilization through: a) Supporting the sustainable rearing of quality and healthy Kuroiler and indigenous chicken parent stock on the government poultry breeding farms for production of hatching eggs, to achieve increased availability of Kuroiler and indigenous chicken through improved production capacity of government and private sector farmers; b) Supporting the establishment and strengthening of functional poultry breeding societies and associations; c) Establishing and equipping national poultry registry centers with herd recording hardware and software.” This is an admirable but tall order. The Kuroiler market has been seriously adulterated by counterfeit and fake birds, while the genuine fowl seems to require more care and attention than it is worth to the poorest farmers, to whom it was originally directed.

Expectations were raised that were beyond the reality in which the Kuroiler could possibly exist. Funding was provided for the distribution of an innovation that was considered — with good reason — to be so sound that it hardly needed promotion beyond information about its productivity levels. However, while the productivity levels of the Kuroiler chicken undeniably far exceed those of local and indigenous stocks, the downside can also be considerable and may require more risk, in terms of initial outlay and labor input, than the average poor farmer may have been prepared to support.

Inadequate training and awareness-raising may have led to not only negative experience on the part of many early adopters, but adulteration of the poultry gene pool. This could, in its worst-case scenario, result in large-scale sterilization of the native breed of chicken, on which so many livelihoods depend. Hence, though the benefits of the Kuroiler chicken have been identified and, rightly, promoted, its introduction to Uganda is not anodyne. The problems associated with Kuroilers need to be considered alongside its advantages, since both will increase if the innovation goes further to scale.

VIII. LESSONS FOR DONORS

A. Identify the Right Package of Innovations

If the scale to be achieved includes an entire population of producers, entrepreneurs, and households, then the innovation has to be based on a package easily understood and implemented by that population. A particular danger illustrated by the experience of Kuroilers in Uganda is that it gives the appearance of simplicity and familiarity to something that is, in fact, far more complex and “foreign.” In other words, the Kuroiler implementation requires a major change in established practices in the countryside (not so much in the urban setting, where rearing chickens in cages is more established), but the breed is marketed as being just another, but better, kind of scavenger bird; it is not. The promoters reduced the “product” in this case to the chickens, instead of the entire package of innovations that included education, training, facilities of penning, infrastructure to supply essential inputs, and the establishment of institutions of monitoring, regulation, and enforcement.

“Identifying the right package” is complex and goes beyond merely selecting one innovation that might be a success, in isolation from its surrounding and necessary package of innovations.

B. Identify the Optimum Beneficiaries

Where Kuroilers appear to have been successful is at the medium level of better-off smallholders who are able to maintain a flock of more than 20 or 30 birds, which makes it worthwhile to learn to look after them properly (although not without some challenges). Had the project been targeted at this group, it could have yielded more positive results because it would have involved a smaller population for DVOs and extension workers to work with. It would have been much easier to evaluate the impact of the breed on this smaller group of dedicated producers, then work to scale to smaller farmers.

C. Put in Place a Commercially Oriented Monitoring System

Little is known statistically about the average profit experience of small farmer adopters, let alone their variance. This is true regarding repeat purchasers or the profitability of the MU operators because of the uncontrolled nature of distribution.¹¹² As a result, it is impossible to undertake post-purchase surveys to establish purchase and abandonment patterns and motivations. This makes fine-tuning the program more difficult.

D. Identify and Act on Training and Extension Needs

The properties of the Kuroiler that render it advantageous require training and understanding for the breed to be used optimally. If the solution to a developmental problem requires complexity, then that complexity must be acknowledged and dealt with, especially in the context of scaling. Donor investment was primarily aimed at facilitating distribution of the innovation — limited to the chickens and without other elements of the innovation package — and only minimally directed toward training. The main beneficiaries of training were (and are) the MUs, and many of those have since ceased trading. In addition, the training they received was in management and bookkeeping as well as how to manage the DOCs. They were given little or no training in how to teach their customers or advise them about the risks of the breed, as well as the advantages.

¹¹² Communication from former Gates Foundation case officer: “Unfortunately, it has been very hard to track end customer information ... given the intermediated supply chain.”

One problem with the Kuroiler is its hidden strangeness. It received widespread acceptance in Uganda in part because of its resemblance to local birds. Farmers were told that it was an easy substitute that would bring great benefits; instead, it scoured the compound until there was little left, the cocks mounted local hens and injured or killed them, or flocks died from preventable diseases. Of course, the review team heard about many cases of success with Kuroilers that contained none of these, but enough negative experiences occurred to make the case for thorough training indisputable.

E. Identify the Right Innovation and Research Partner

In the case of the Kuroiler, the Indian partner is clearly experienced and motivated by a desire to improve the livelihoods of poor communities, while operating a viable commercial business. The company's research and experience leads them to conclude that their innovation could have wider application. Keggfarms had commercial experience and incentives.

The research team at ASU, similarly, had strong technical capacity and hard evidence that the Kuroiler could and should be adapted to the Ugandan reality with benefits for poor communities. Their motivation was also based on a firm and frequently expressed desire to improve rural livelihoods and the status of women. What would have assisted in the process of scaling up was expertise in commercialization in the Ugandan rural market and poultry distribution system. The adaptation of the Kuroiler chicken to the Ugandan market requires more than the technical excellence displayed by the two external sponsors.

Donors need to take independent stock of the reality of a market situation if they wish to use commercial pathways to take an innovation to scale, rather than solely relying on the technical expertise of the research and development partners behind the innovation. In Uganda, it was worthwhile to ally with the public authorities at the beginning of the project; they also have experience in research and innovation. But the transition to the private sector was not well planned and now two parallel supply channels market Kuroiler chicks. The public sector would like to maintain a "three-week only" channel, but the private sector is prepared to sell DOCs to all comers.

F. Identify the Right Commercial Partner

The private sector has an advantage over state and quasi-state bodies: It is obliged to pursue profitability to survive and it has control over how its profits are used. This means — at least theoretically — that it is required to be more efficient, market-focused, and ready to take advantage of opportunities for maximizing profitability. Thus the choice of the Ugandan commercial partner was, superficially at least, a good one. The company recognizes that the success of its operation depends on satisfied customers and that without proper knowledge and training, the company's personnel would turn "from an asset to a liability."¹¹³ Hence, the company does attempt to offer training to purchasers of its products, despite customers' reluctance based on the belief that, "It's a chicken. A chicken. I have been around these all my life!"¹¹⁴

In addition, the company is dedicated to marketing Kuroiler chickens. It has set aside considerable facilities to accommodate the breed, trained its staff in incubation and management of hatchlings and acquired land to build additional premises for raising the birds. The facilities and locations are equipped with security measures to guard against theft or mistreatment of the stocks. Aware of the unpredictability of the Ugandan market, the company is seeking customers outside the country. While export marketing may

¹¹³ Interview, Chick Masters Ltd, June 24, 2016.

¹¹⁴ Interview, Chick Masters Ltd, June 24, 2016. The company's receptionist told the review team this was a common reaction, based on the idea that smallholders were already *paying* for a chicken and did not think they needed to learn to look after it.

reduce the flow of product to the national market (hindering scaling), it does contribute to the long-term viability of the firm and therefore to its potential to drive the innovation to scale within Uganda.

G. Estimate Realistic Funding Costs Beyond Initial Start-Up

Without the involvement of an outside donor, it is unlikely that Kuroilers would have been introduced to Uganda. Even the government, through NAGRC, did not have the resources it would need to establish a breeding facility in Uganda and the private sector had neither means nor incentive to do so.

However, the need for funding does not necessarily begin and end with the introduction of the innovation. The proposition that the Kuroiler was merely a substitute for the local variety should have been tested more thoroughly, as should the real possibilities of marketing the output in the context of a weak regulatory environment, poor infrastructure, and a low level of expertise among the target population. Ideally, market studies should have been carried out, and estimates were needed of the feasibility and cost of training farmers in the specifics of raising Kuroilers and marketing them. There could also have been analyses of the most likely adopters in the farming population, so as not to create expectations among other farming communities that could not be met, while estimating the likely correct target demographic and the degree of poverty alleviation and economic growth to which an intervention might lead.

On the basis of studies prior to the introduction of an innovation, funds from donors should be used to perform pre-introduction studies cooperatively with private partners, the better to prepare the ground and contribute to the chances of success in scaling up. In the light of such studies, potential or actual problems can be tackled and donor funding can be allocated to them appropriately.

H. Identify Weak Links in the Value Chain and Address Them

The creation of an effective national production and distribution system for Kuroilers was a major breakdown in the scaling effort, partly because it was assumed that a system similar to the one operating in India would develop in Uganda. This has not happened for reasons that include: 1) tradition and the habits of small traders who do not like to carry livestock; 2) the circumspection of farmers who prefer to purchase live animals directly from the supplier, rather than from an agent in the form of a trader or MU; 3) the high costs and risks associated with the MUs; 4) the nature of small-scale marketing that generally centers for smallholders on selling poultry by the side of the road and not in a “village market”; and 5) the unwillingness of smallholders and householders to invest in the basics required to raise Kuroilers successfully.

I. Be Aware of and Acknowledge Potential Negative Effects

The launch of an innovation is not the end of the story, although some donors may feel that is the limit of their commitment. However, any innovation has the potential to impact other parts of the economy, especially in a rural context, where the ultimate effects might be particularly unpredictable.

The impact of introducing any exotic breed, however, can have effects that a donor must consider when establishing a funding protocol. Donors could have anticipated many problems in the Kuroiler project: 1) the aggressive feeding habits, 2) the need for careful vaccination, 3) aggressive Kuroiler male behavior in mating, and 4) the need for supplemental feeding. The introduction of the Kuroiler chicken into Uganda also carried risks, one of which is: “The uncontrolled use of imported breeds for possible crossbreeding of the rural flocks could seriously jeopardize the existence of indigenous chickens apart from threatening the genetic diversity that might contribute to hopeful discoveries in the areas of immune resistance against

important diseases currently bypassed.”¹¹⁵ This is what may happen in Uganda if the interbreeding of Kuroilers with local chickens continues. The lack of the brooding gene in the Kuroiler breed means that local hens bred with them will increasingly produce offspring that also lack the brooding gene. While this is not a problem in industrial environments where incubators are readily available, in the countryside, where the poorest farmers depend on their chickens for survival, it would be a huge challenge.

The responsibility of the donor in such a scenario is to be determined. However, it is not a situation that donors would wish to impart on a developing economy through their development assistance efforts.

¹¹⁵ Fotsa, J.-C. (2011) *Genetic Characteristics of Indigenous Chickens in Cameroon*, Institute of Agricultural Research for Development, Mankon Specialized Research Station (SSRAD), Bamenda, Cameroon.

ANNEX: LIST OF INTERVIEWEES, JULY 2016

No.	Name	Organization	Occupation	Contact	Role in the Kuroiler Value Chain
1	Dr. Esau Galukande	Kampala Capital City Authority	Deputy Director for Production and Marketing.	+256 772 415524 Email: esaugalu@yahoo.com	Supporting Institution
2	Dr. Justine Alinaitwa	Kampala Capital City Authority	Lubaga Division Production Officer	+256 794 660119 Email: jalinaitwe@kcca.go.ug	Supporting institution
3	Mrs. Christine Masiko	Own/Family Business	Housewife/ Farmer	Wankulukuku Village, Kabowa Parish, Lubaga Division	Production
4	Mr. Patrick Ssekabira	Own/Family Business	Poultry Keeper	Wankulukuku Village, Kabowa Parish, Lubaga Division	Production
5	Mrs. Esther Mugerwa	Group / Family Business	Commercial Farmer	(+256 714 565517)	Production
6	Ms. Margaret Nakamya	Own/Family Business.	House wife / Commercial Farmer	Kamwokya II Parish, Kampala Central Division	Production
7	Mrs. Jane Mugerwa	Kamwokya Women Savings and Credit Association.	Group leader and poultry commercial Farmer	(+256 772 649179 or +256 705 787646)	Commercial production
8	Dr. Jackson F. Mubiru.	NAGRIC & DB	Director - Rural Poultry Development Program.	+256 772 403 256, Email: mubirufanco@gmail.com	Advisory, breeding, and distribution
9	Ms. Linda Judith	NAGRIC & DB	Kuroiler Marketing Manager	Email: jdthlinda@gmail.com	
10	Ms. Dorothy Nakaguma	NAGRIC & DB	Kuroiler Production Manager	Email: dorothynakagoma@yahoo.com	
11	Mr. Samuel Tibandeke	NAGRIC & DB	Hatchery Operator	+256702846401	
12	Mr. Wilfred Kule	Busitema Agricultural College	Student Intern – Veterinary Dept	Email: wifredkule43@gmail.com	
13	Ms. Rita Namusoke	Own /Family Business.	Luweero Kuroiler Commercial Farmer	+256 782 760914 or +256 702 513943	Mother unit operator
14	Mr. Edward Mwogeza	Kikandwa Rural Communities Development Organization (KIRUCODO)	Marketing Manager	+256 772 460082 # 494 Kikandwa Village, Kabembe Parish, Kyampisi Sub-County	Mother unit operator

No.	Name	Organization	Occupation	Contact	Role in the Kuroiler Value Chain
15	Ms. Rita Namusoke	Kikandwa Women Group	Farmer	Kikandwa Village	Production
16	Mrs. Olivia Sempangi	Senda Poultry Farm Breeders Ltd	Technical Director	+256 312 112575 sendafarm@yahoo.com	Breeders/Mother unit
17	Mrs. Miriam Nakato	Katosi Women Development Trust (FGD)	Program Coordinator	Katosi Central, Ntenjeru Sub-county, Mukono district, Uganda	Production
18	Mrs. Margret Nakato Lubyayi	Katosi Women Development Trust (FGD)	Treasurer	Katosi Central, Ntenjeru Sub-county, Mukono district, Uganda	Production
19	Mr. Roland Musoke	Katosi Village	Village Local Council Representative (LCI)	Katosi Central, Ntenjeru Sub-county, Mukono district, Uganda	Production
20	Ms. Rita Mukiibi	Katosi Village	Youth representative	Katosi Central, Ntenjeru Sub-county, Mukono district, Uganda	Production
21	Dr. Steven Kiwemba	NAGRIC &DB /Kuroiler Program	District Production Officer – Jinja/Mayuge	+256706122828 dvojinja@gmail.com	Advisory, breeding, and distribution
22	Mr. Diamond Musinga	NAGRIC &DB / NAADS Kuroiler programme	District Production Officer – Kabale	+256702940982 dvokabale@gmail.com	Advisory, breeding, and distribution
23	Mr. Robert Opolot	Mayuge Women Poultry Association.	Marketing and Mobilization Officer	+256772460082 Robertopolot24@yahoo.co.uk	Production
24	Mrs. Lukiya Mugongo	Bulindi - Mayuge Goats Trust Association.	Chairperson/Poultry Keeper.	Bulindimayuge2000@hotmail.com	Production
25	Mr. Robert Taitika	Bugembe Youth IGA Association	Group Chairman		Production
26	Pastor Peterson Ssozi	Presbyterian Church Poultry Project.	Commercial Farmer/Breeder.	petereson.sozi@gmail.com Makindye, Kizunfu Zone	Production/Breeder
27	Mr. Susan Lukwango	Africa Uganda Poultry Farming Guide	Commercial Farmer/Breeder	lukwagosusan@hotmail.com Nsangi Mengo Busiro Plot 238 18km Masaka Road Uganda	Production/Breeder
28	Dr. David Waiswa	Kampala Capital City Authority	Division Vet Officer - Makindye	+256776004330 davwaiswa2011@gmail.com	Supporting Institution
30	Mr. Bernard Kiyaga	Kiyaga Poultry Breeders	Managing Director	+256700857148 or +256775236231 On Mukono/Kayunga Road.	Agro stockiest Production
31	Dr. Tonny Aliro	NAGRIC &DB / NAADS Kuroiler programme	Gulu District Vetnary Officer.	dvogulu@gmail.com	Advisory, breeding, and distribution.

No.	Name	Organization	Occupation	Contact	Role in the Kuroiler Value Chain
32	Mr. Ocan Godfrey	Food and Agricultural Organization- Northern Uganda	Programmer Officer	godfrey.ocan@fao.org ocangodfrey@gmail.com	Supporting Institution
33	Mr. Martin Ojara Mapenduzi	Gulu District Local Government	LC V Chairman.	ojaramapenduzi@yahoo.co.uk ojaramapenduzi@gmail.com	Public Sector Government.
34	Mr. Ocaya Samuel Alitor	CARYM FARMERS GROUP	Group Secretary and Marketing Officer	+256 772 331 309; Unyama Village, in Unyama Sub county in Gulu District.	Production
35	Mr. Sam Ojok	Own /Family Business.	Gulu Commercial Farmer	(+256 772 329 082); Layibi Division.	Production
36	Mr. David Olara	Own /Family Business.	Gulu Commercial Farmer	(+256 775 455 966); Bandage Division	Breeder/Production
37	Mr. Richard Ogaba	Own /Family Business.	Gulu Commercial Farmer	(+256 775 323249); Coopill Village, Piacho Sub county in Gulu District.	Production
38	Mr. Samuel Baker Ojok	Gulu Kuroiler Hatchery	ASIIMA Hatcher/Breeder	+256 774 282 819 Kirombe, Layibi Division, Gulu District.	Incubating / Breeder / distribution
39	Mr. Edward Otika	Otika Poultry Solutions Ltd	ASIIMA Hatcher/Breeder	+256775 284 429 or +256 705 284 429 otikaedward@gmail.com	
40	Ms. Maureen Ninsiima	Sport Outreach Ministry	SOM Gulu Manager/farmer	All employees of Sport Outreach Ministry (+256 772 653 299) or Email: gulusom@gmail.com Koro Alibi Village in Gulu District.	Production
41	Ms. Brenda Akello	Sport Outreach Ministry	Administrator/Farmer		
42	Mrs. Grace	Sport Outreach Ministry	Poultry Project Trainer		
43	Mr. Brian	Sport Outreach Ministry	Poultry Attendant.		
44	Mrs. Carla Ojera	Family Business	Poultry Keeper	(+256 780 121 053, Pece division	Production
45	Mr. Michael Omoya	Family Business	Commercial Famer	+256 776 954 343 Pece Division, Aywee sub ward omoyamikeokee@gmail.com	Production/Distribution
46	Mr. Johnson Ojok	Apac Local Government	Ass. District Vetnary Officer	+256775868694	Advisory, breeding, and distribution
47	Mr. Apollo James	Apac Local Government	Assistant financial Officer/Farmer		
48	Mr. Kenneth Orech	Apac Local Government	District Entomologist		
49	Ms. Lucky Ayugi	Otim Peter's Poultry Commercial farm.	Farm Manager	+256782705387	Production

No.	Name	Organization	Occupation	Contact	Role in the Kuroiler Value Chain
50	Dr. Wilson Okwir	Lira District Local Government	District Production and Marketing Officer	+256772979840	Advisory, breeding, and distribution.
51	Mr. Fred Alele	Farmers friend Limited	Managing Director Commercial farmer	+256772531267 +256756531267	Agro stockiest / Production
52	Mrs. Elya Egwelo	Elya Demonstration Farms	Managing Director	+256776506506	Production, Advisory services/trainer/Breeder
53	Mr. Emuna Innocent	Family Business	Commercial farmer	+256772991884	Production
54	Ms. Stella Nabasirye	Chick Masters Limited	Support/Marketing Staff	+256774343968	Private Sector/Investor
55	Dr. Hurunah Kaaya	Chick Masters Limited	Managing Director		
56	Mr. David Njuguna	Kenyan Commercial Farmer	Buyer/Supplier in Busia, Kenya	+254	Exporter (Kenyan Businessman)
57	Mr. Charles Kidega	ASIIMA Agric. Concern Ltd	Project Coordinator	+256704812943 +256787238837	Private Sector/Investor
58	Dr. Nicholas Kauta	Ministry of Agriculture, Animal Resources and Fisheries. (MAAFI),	Commissioner, Animal resources Directorate.	+256772693257	Public Sector / Government
59	Dr. Kenneth Nyombi	Commercial farmer Kuroiler Breeder	Researcher	+256772399838 (1 km from Kawanda TC on Namalere Road	Production/Breeder
60	Mr. Francis Alumai	TPO - Uganda	Gulu - Program Manager	+256772994662	NGO/Support Institution
61	Mr. Edward Mwogeza	Kikandwa Rural Community Development Organization (KIRUCODO)	Marketing Manager	+256 772 460082	Community-Based Organization
62	Ms. Rita Namusoke	Kikandwa Rural Community Development Organization (KIRUCODO)	Member	-	Community-Based Organization
63	Mrs. Olivia Sempangi.	Senda Poultry Farm Breeders	Technical Director	+256 312 112575, +256 392 889934, sendafarm@yahoo.com	Production/Breeder

No.	Name	Organization	Occupation	Contact	Role in the Kuroiler Value Chain
64	Mrs. Miriam Nakato	Katosi Women Development Trust (FGD)	Coordinator		Community based Organization.
65	Mrs. Margret Nakato Lubyayi	Katosi Women Development Trust (FGD)	Treasurer		Community based Organization.
66	Mr. Roland Musoke	Katosi Sub-County - Mukono	Village Local Council Representative (LCI)		Mukono Local Government
67	Ms. Rita Mukiibi	Katosi Sub-County - Mukono	Youth representative		Mukono Local Government
68	Dr. Joshua	Mayuge District Production and Marketing Department	Mayuge District Veterinary Officer.		Local government
69	Mr. Rashid Naku	Bwondha Sub-County, Mayuge	Bwondha LC I chairperson		Local government
70	Mr. Paul Ojikan	Mayuge District Farmers Association in Imanyiro sub county	Coordinator		Community-Based Organization
71	Mr. Tentena Wakida, a farmer under.	Musubi farmers group in Kigandalo village	Poultry Farmer		Farmer
72	Mr. Kataike Ronald	Rock Trust, a group of 21 small-holder farmers from Mayuge district	Poultry Farmer		Farmer
73	Mrs. Rita Kalenga	Her farm in Bugembe	Poultry Farmer		Farmer
74	Mr. Sula Luganda	His farm in Bugembe	Poultry Farmer		Farmer
75	Ms. Farida Namulondo	Her farm in Buwenge	Poultry Farmer		Farmer
76	Dr. Luute Nicholas	Ugachick Poultry Breeders Ltd	Operations manager	Poultry Store Matia Mulumba Rd · +256 41 4250341	Poultry Breeders and Processors