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### **Upgrading Village Chicken Value Chains in Ghana: An Application of Spatial Group Model Building**

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#### **Introduction**

Chicken rearing in Ghana is dominated by small-scale backyard production (Andam et al., 2017; Sumberg et al., 2013). This system of production accounted for 64% of the total count of poultry birds in Ghana in 2009 (FAO, 2014). However, not much attention has been paid to this poultry sub-sector in terms of investment or policy support. Many local producers do not invest in appropriate biosecurity measures or adopt appropriate strategies to prevent the outbreak of preventable poultry diseases (FAO, 2013). Furthermore, public investments and policies to facilitate the access of local chicken producers to finance, inputs, training on appropriate poultry husbandry and disease control, and veterinary services, are generally lacking (Naggujja et al., 2020). Additionally, competition from imports of lower-priced chicken products, an issue so far unaddressed by policy, has created a challenging market environment for domestic chicken producers (Ashitey, 2017).

At the same time, there may exist a growing demand in (niche) markets, for the products of local breeds of chicken raised in backyard production systems due to the preference by consumers for these as food and for religious purposes, particularly during festive seasons (Naggujja et al., 2020). Smallholder producers of these indigenous breeds, many of whom reside in the Northern and Upper East Regions of Ghana where nearly half (46%) of Ghana's backyard poultry production occurs, may be particularly poised to meet the growing demand. In these two regions where livestock keeping is an important activity, poultry keeping is one of the key livestock activities, including for women (Awuni, J.A., 2002; Sonaiya and Swan, 2004; Sonaiya et al., 1999). While the entire poultry sector of Ghana faces many challenges from ineffective coordination between actors, weak markets, and the lack of an enabling environment regarding product quality and standards (McGovern-Dole, 2015), these challenges may be exacerbated in the context of smallholder producers and backyard production systems (Sonaiya and Swan, 2004). These constraints may severely limit the potential for smallholder chicken producers to seize opportunities presented by the growing consumer demand for poultry products in rural and urban areas in Ghana.

This study investigated the constraints to upgrading backyard chicken production systems in Northern Ghana, exploring the potential for interventions in such areas as aggregation systems to improve the efficiency of the local value chain. The study focused on important chicken-producing sites in Northern and Upper East regions in Ghana, examining the amenability of the system characteristics of the chicken sub-sector to innovative marketing programs, and potential bottlenecks to innovation uptake.

#### **Material and Methods**

The study followed a systems-thinking approach that used qualitative system mapping to identify system characteristics, feedbacks, and potential leverage points for change (Mumba et al., 2017; Rich

et al., 2018; Rich et al., 2021). The qualitative approach employed is an innovative adaptation of participatory processes known as Group Model Building (GMB) (Vennix, 1996) that accounts not only for spatial attributes of the phenomena under investigation, but for challenges associated with in-person focus groups due to Covid-19 (Rich et al., 2018; Berends et al., 2021). In the current adaptation, the Spatial Group Model Building (SGMB) method utilized a novel, hybrid offline and online approach that facilitated interactions with stakeholders in both asynchronous fashion and through targeted, short virtual sessions in real time. A group of eight (8) individuals selected from the local chicken value chain made up the stakeholder reference group engaged in the SGMB process over eight weeks. The group included representatives of (male and female) chicken farmers and farmer groups in the two regions; a government Ministry of Agriculture officer in charge of livestock; a livestock field extension officer; a private provider of veterinary services; an aggregator; a feed/input dealer; and a representative from a livestock-focussed NGO. Some stakeholders represented more than one function in the chicken value chain as they, for example, were involved in product processing but had prior experience with chicken production. The stakeholders were selected based on their active roles in the value chain and their interest. The selected farmers had been identified as commercially motivated male and female farmers willing to take up new value chain innovations.

A series of six (6) online sessions was conducted using Zoom between February and March 2021, with each session occurring in plenary and lasting for approximately two hours. Each session had a lead facilitator with good knowledge of the topic under discussion and training in the practise of SGMB. Supporting facilitators collected data during the sessions, projecting these for participants' visualization in real time (using the online data visualization tool Google Jamboard). Other members of the facilitation team served as dedicated note takers throughout, taking down hand-written and typed notes that were later processed, organized, and analysed. A process coach guided the overall process.

Between the online sessions, study participants worked individually with detailed workbooks of activities that had been physically couriered to them (Vennix 1996). The workbooks used participatory GIS techniques to solicit information on system characteristics related to socioeconomics of the study areas, chicken production and other livelihood activities, live bird and chicken product marketing and distribution, poultry disease management, and the use of veterinary and other services. The workbook also included templates for participants to identify and prioritize problems perceived to pose the key constraints in the system, as well as their causes and consequences. Online sessions that followed the individual workbook activities allowed participants to brainstorm and to co-generate additional insights and knowledge, providing a forum for exploring group consensus on the divergent findings that emerged from the individual workbooks. The research team processed and synthesized the online and offline-generated data, presenting the collective findings to participants for validation and improvement, using an iterative process. Final outputs from the SGMB process were organized using causal loop diagrams depicting the variables, stocks, flows and feedbacks relevant to an upgrading of the backyard chicken value chain in Northern and Upper East regions of Ghana, and an accompanying narrative.

Ethics approval for this study was obtained through ILRI's global Institutional Research Ethics Committee (IREC) and the Institutional Review Board (IRB) of the Council for Scientific and Industrial Research (CSIR) in Ghana.

## **Results and Discussion**

Findings from the study were consistent with previous indications that chicken production is an important economic activity for many individuals in the rural informal sector at the study sites, as well as a secondary source of income to workers in private and public sector employment. The SGMB process further established the presence of a growing but seasonal niche market for poultry products, with demand for products of local chicken breeds typically higher during festive periods and around urban areas. Prices for local chicken were reported to be slightly higher than those of frozen imported chicken products.

Participants identified a key constraint of local chicken production as its being mainly small scale and extensive or semi-intensive. The absence of wholesale markets close to the major producing areas was also seen as a major hindrance to effective market participation by the smallholder producers. Farmers in the area were reported to have limited expertise in moving and marketing birds to larger markets. A lack of agency and heavy reliance on live bird traders and aggregators who served as middlemen between the primary areas of production and retail resulted in low farm gate prices and farmers not being in position to capture potential value in supply and distribution chains. Given the low levels of return, chicken farmers were reluctant to adopt technologies such as vaccination, although vaccines are available against viral poultry diseases such as Newcastle that stakeholders identified as the most common poultry disease and one that routinely devastates chicken flocks across the study sites.

The major constraints affecting the local chicken value chain were listed to include high levels of disease (“disease dynamics”), coupled with a lack of proper biosecurity measures and inadequate skills in husbandry and management, informality of production and the lack of a working organizational structure in the sector, scarcity of feeds and other production inputs, limited consumer information, and the lack of an enabling policy environment. Facilitated prioritization by the stakeholders highlighted disease dynamics, informal approaches to production, and skills and knowledge gaps as the three major sets of challenges facing the value chain. Socioeconomic realities, historical biases and cultural norms may in addition have exacerbated these constraints along gender lines. Stakeholders agreed that social norms and traditions influencing the backyard chicken value chain did not favor women economically, as they were prohibited outrightly from selling live birds in regional wholesale markets, or otherwise discouraged from participating in many value chain activities. As such, women were reported to be limited to production-related and lower returns activities within the value chain.

The SGMB process in overall generated six distinct modules of a causal loop diagram, based on the priority sectors that emerged from the problem identification and prioritization exercises. Important feedbacks were shown to exist between the production of small-scale backyard poultry and processes across the wider food system, including farmer population and livelihood dynamics, marketing, and disease management as shown in Figure 1. The interlinkages between the different modules suggest that it may not be possible to improve production quantities and qualities alone (e.g., via the introduction of productivity-enhancing technology in hatching and chick growth), without considering the various constraints imposed by local livelihoods, diseases dynamics (i.e., Newcastle disease and worm infestations) and marketing processes. Therefore, given the number and diversity of module interconnections, decision makers and policymakers must maintain a holistic view of the system, to avoid efforts to increase local consumption through increased productivity being derailed by issues of disease management, food safety and/or distribution inequalities.

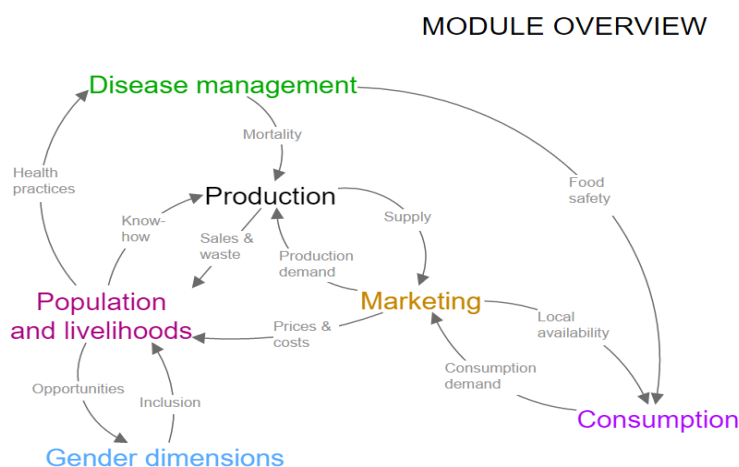


Figure 1 An overview of the six modules that synthesises the complete stock-and-flow diagram of the Ghana backyard poultry sector

The systems analysis indicated that the ability of smallholders to commercialize is at least partly dependent on their ability to avoid and treat diseases, minimize the risk of predation and of their birds being snatched as prey, and avoid using contaminated or spoiled feed. The participation of female actors within the local poultry system can be increased through increasing the acceptance of women participating in activities such as marketing and processing as well as via the contributions of female actors to the incomes of households involved in poultry. A systems map generated within the higher-level modules of figure 1 suggest that without significant value chain commercialisation, the increased participation of females in the value chain is almost entirely dependent upon outside interventions to overcome cultural/traditional barriers. The future commercialisation of the value chain is also linked to other trajectories such as disease and predation management practices that are likely to become more important under future trajectories of climate change.

## Conclusions and Outlook

The SGMB process provided many important insights, highlighting the diverse interactions of the poultry value chain, particularly some of the policy and institutional aspects that may have been overlooked. This study conforms to other studies concerned with the equitable development of food systems (e.g., Herrero et al., 2021; Kawabata et al., 2020; Mylona et al., 2018), which suggest that policymakers should not expect to be able to simultaneously commercialise the local value chain and improve the availability of produce within local markets without intervening at multiple points within the food system. In the drive to commercialize local chicken value chains, therefore, policymakers must consider producers as well as the wider market environment and drivers of consumer demand. Commercialising the backyard poultry sector alone with a view to increasing production, reducing disease burdens, and improving transport links to urban centres may have long-term consequences for the availability of poultry products within the local market environments of northern Ghana. The increased participation of females in the value chain may be a powerful driver of value chain commercialisation. From a process standpoint, this work successfully piloted an innovative hybrid approach to systems thinking facilitation, demonstrating how a full SGMB process can be catalysed without face-to-face interactions in person.

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