

**ENHANCING BACKYARD POULTRY ENTERPRISE PERFORMANCE IN
THE TECHIMAN AREA: A VALUE CHAIN ANALYSIS**

**Asem-Bansah CK*¹, Sakyi-Dawson O¹, Ackah-Nyamike EE¹,
Colecraft EK² and GS Marquis³**



Charles Asem-Bansah

*Corresponding author email: kabans622002@yahoo.co.uk

¹ Department of Agricultural Extension, College of Agricultural and Consumer Sciences, University of Ghana, Legon, Ghana.

² Department of Nutrition and Food Science, University of Ghana, Legon, Ghana.

³ School of Dietetics and Human Nutrition, McGill University, Montreal, QC, Canada.

ABSTRACT

Backyard Poultry (BP) production is widespread among rural households in Ghana and provides an opportunity for small scale enterprise development to contribute to poverty alleviation. Traditionally, efforts to improve poultry production activities have emphasized the technical aspects of production while neglecting the social and organizational processes that underlie BP enterprises. A value chain framework was used to qualitatively assess BP enterprises in two communities in the Techiman Municipality of the Brong Ahafo Region in Ghana. The main purpose of the study was to understand how the activities and relationships among actors along the BP value chain influence BP enterprise performance and its implications for development of the industry. Community key informants defined a BP enterprise as ownership of at least ten post vulnerability age chickens (defined as ability to roost on trees to escape predators and disease). All identified BP farmers in the communities were classified as 'high' and 'low' enterprise performers based on flock size of 'post- vulnerability age chickens'. The study participants included a purposive sample of 'low' (n=10) and 'high' (n=10) performing BP farmers from each community as well as service providers and support institutions in the BP value chain identified through snowball sampling. Qualitative data were collected using focus group discussions and key informant interviews. Content analysis was used to summarize themes and patterns from the interview transcripts and to compare high and low performing BP enterprises based on the identified activities and relationships. Higher BP enterprise performance was associated with stronger inter- and intra-actor integration of activities in the various functions of the value chain and higher investment of resources in the activities of the value chain. Additionally, opportunities for import substitution to meet the high national demand for chicken meat were identified. Sustainable improvements in the BP sector must involve social, relational, organizational, as well as technical innovation.

Key words: Backyard poultry, Competitiveness, Value chain

INTRODUCTION

Animal source foods are important sources of quality protein and bio-available micronutrients and have been shown to enhance child growth and cognitive development [1, 2]. In sub-Saharan Africa, diets are predominantly plant-based and contribute to the high prevalence of multiple micronutrient deficiencies in children [3]. Efforts to increase the availability of and access to micronutrient-rich Animal Source Foods (ASF) are needed to improve African children's diets. Backyard Poultry (BP) enterprises can contribute to these efforts.

Backyard Poultry (BP) production refers to non-industrial poultry rearing activities within homesteads, which typically involve unimproved chicken breeds. It reportedly contributes 70% and 20% of poultry products and animal protein intake respectively, in most African countries [1]. Improving BP enterprise performance could potentially result in increased income generation from the sector as well as enhance household availability and accessibility of poultry meat and products and thereby improve household food security [1].

Backyard Poultry has several advantages over other agricultural enterprises involving the rural poor. It is the most widespread agricultural enterprise; it defies ecological limitations and gender barriers; there are few, if any, religious or ethnic objections to poultry rearing and consumption; women equally are familiar with BP production (they are often primary caretakers) as men; is a renewable resource through egg production; has a short production cycle; chickens contribute to environmental cleanliness; has low investment and fast turnover; the chicken in terms of size is convenient for a family meal; and it makes significant contributions to household economic, social and cultural welfare [4].

In Ghana, chickens from BP enterprises account for 60-80% of national poultry population [5]. Besides contributing to household income, nutrition and food security, the products of BP are used for various cultural and ceremonial rites such as payment of bride price for marriage [6]. Although BP production is prevalent in Ghana; the country still imports over 44,000 metric tonnes of poultry meat annually [7]. This may, in part, be a reflection of the low productivity of the BP industry in Ghana [6]. The average per capita poultry product consumption in Ghana is about 12 eggs and 1.2kg of poultry meat per annum compared to a global average of 154 eggs and 9.7kg of poultry meat per annum [5].

Interventions aimed at improving the BP industry in developing countries have focused mostly on the technical aspects of production such as improving feeding, housing and diseases control. This emphasis stems from the assumption that technical efficiency is the main ingredient for enhanced performance of the agricultural industry. However, social organizational processes play important roles in the BP enterprise and need to be considered in efforts to improve the sector. This is consistent with current thinking on agricultural innovation, which stresses that innovations should encompass technical as well as social organizational elements [8]. Consequently, sustainable improvements in the BP sector are believed to require

assessment and strategies to address its social organizational processes and not just the technical aspects of production [4, 9]. A value chain review of the BP sector can provide a holistic analysis of the cultural, organizational and technical elements of the industry to inform recommendations for improving the sector. Thus, the overall objective of this study was to use a value chain approach to describe BP enterprises in rural Ghana.

Research Question

The main research question guiding the study was: To what extent do activities of actors, support institutions and relationships along the BP value chain influence the performance of the BP industry in the Techiman area of Ghana? This question was explored by determining: (i) the functions, actors and support institutions in the BP value chain; (ii) the nature of the activities of actors and their effect on the performance of the BP value chain; and (iii) the nature of linkages in the BP value chain and their relationship with its performance.

CONCEPTUAL FRAMEWORK

The research was guided by a priori conceptual framework adapted from the United States Agency for International Development (USAID) value chain framework (Figure 1) [10]. The basic premise of the framework is that through enterprise organization, individuals can synergize their productive capacities to achieve high economic returns with collective benefits for improved quality of life [11]. The framework comprises three key components: *functions, actors and support institutions* and the elements that link them together but does not consider the global environment. A consumption function is included as it is believed to contribute to upward movement of BP products in the value chain. Furthermore the 'support services' element in the USAID framework has been replaced with *support institutions*. The value chain's competitiveness or performance which is the ability of a firm to offer more post vulnerability age chickens (that is chickens above six weeks) that meet the quality standards of the markets at prices that are competitive and provide adequate returns which also depends on the activities and inter-relationships of the three key components of the framework. The conceptual framework guided the identification and selection of study participants as well as the data collection processes.

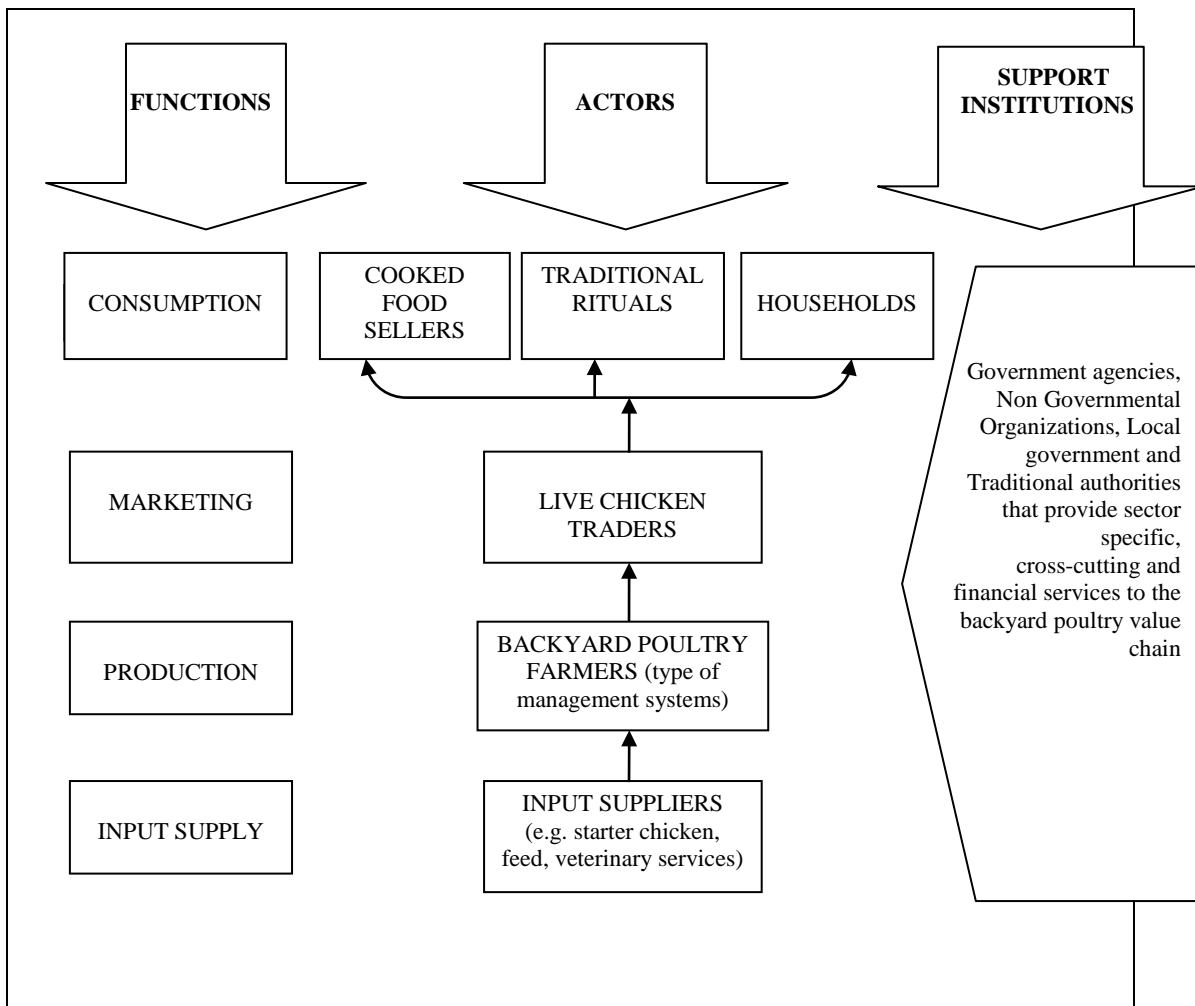


Figure 1: *A priori* conceptual framework for understanding relationships between functions, actors and support institutions in the backyard poultry value chain

MATERIALS AND METHODS

Study sites

The study sites included two neighboring farming communities that were involved in the Enhancing Child Nutrition through Animal Source Food Management (ENAM) project in the Techiman Municipality. The purpose of the ENAM project was to strengthen women's economic ventures for increased access to animal source foods for child nutrition. The primary farming activity of the two study communities was crop farming of predominantly food crops such as cassava, yam, maize, plantain, cocoyam, tomato, garden eggs (local eggplant) and pepper. A few of the farmers also farmed cocoa. Other livelihood activities included livestock (mostly sheep and goats), poultry (primarily chickens, guinea fowls, ducks and doves) and petty trading. Almost every household in the two study communities reared chickens with the involvement of men and women as well as children. The most commonly practiced

BP production management systems in the two communities were extensive and semi-intensive systems, although a few women had intensive layer systems which was not the focus of this study. A reconnaissance to the community revealed that chicken rearing was preferred because of its low capital investment, ease of management, suitability of chicken as a gift item, the ability of chickens to multiply quickly, and because most households had a family tradition of rearing chicken. Poultry rearing also served an important coping strategy to counter vulnerability associated with low or failed crop production due to unpredictable rainfall patterns. However, BP production was primarily a part-time venture as full-time engagement was considered risky due to seasonal occurrences of high mortalities.

Study participants

The study participants included BP farmers as well as other actors and representatives of support institutions in the BP value chain as specified by the conceptual framework described above. Selection of the BP farmers began with a fact finding meeting with 10 key informants (comprising of community leaders, elders and organizers) in each community. The key informants confirmed that there were BP farmers in their respective communities and helped to establish criteria for defining BP production as an enterprise and for differentiating between 'high' and 'low' enterprise performers based on flock size of 'post vulnerability age chickens'. This stage of chicken maturity was assessed on the ability to roost on trees, to escape predators and diseases. A cutoff of ownership of at least ten post-vulnerability birds was used to define a BP enterprise. The criteria for high and low BP enterprise performers were defined as BP farmers who had at least 20 or more and less than 20 post-vulnerability age birds, respectively. Based on these criteria, the number of BP farmers identified in each of the two study communities was 41 and 60. In the community with 41 BP farmers, 34% of them were female and 10% of the 60 BP farmers in the other community were female. . With the assistance of the community key informants, groupings by performance category (high or low) were completed for the 41 and 60 BP farmers using the list of BP farmers generated for each community. The assignment of performance categories was validated through individual interviews in the identified households. Each BP farmer's household was then demarcated (with labeling for performance category and gender) on community maps previously developed for each community by key informants during the ENAM project's community entry activities. In each community, 20 BP producers comprising 10 low and 10 high performance farmers were purposively selected based on gender and geographic location in the community. Thus effort was made to ensure gender representativeness and selection from all sections of the map to foster adequate geographical coverage.

Actors for the input supply, marketing and consumption domains as well as the support institutions specified by the conceptual framework were identified using snowball sampling with the BP farmers as the starting point. Thus, besides the BP farmers, the study participants included a total of 12 other key informants representing the input supply (n=2), marketing (n=4) and consumption (n=6) domains of the value chain. Additionally, interviews were completed with eight representatives of the three key support institutions (traditional leaders, Ministry of

Food and Agriculture (MoFA) and the Techiman Municipal Assembly) identified. Ethical approval for the study was granted by the Human Subjects Review Committee at the Noguchi Memorial Institute for Medical Research at the University of Ghana prior to field data collection.

Data collection and analysis

Using semi-structured interview guides, qualitative data were collected through focus group discussions and key informants' interviews. In each of the two communities, separate focus group discussions were held with BP farmers classified as low (n=10) and high (n=10) performers. Thus, a total of four focus group discussions with 40 BP farmers were completed. Additional key informants interviews were completed with six groups of people comprising input suppliers (n=2), marketers (n=4), users of backyard poultry products (n=6), traditional authorities (n=4) municipal assembly (n=2) and Ministry of Food and Agriculture (n=2). Content analysis was used to summarize themes and patterns from the transcripts generated from the focus group discussions and key informant interviews [12]. Inferences relative to the activities of the various actors and their inter-linkages were drawn from the emergent themes and patterns while making comparisons between high and low performing BP farmer. Activities of actors in the chain for both the high and low performing BP farmers were traced from the upstream actors to the downstream actors under specific themes. For each theme, the activities of the actors were compared and contrasted for the two groups of farmers. Similarly the relationships in the BP value chain were compared and contrasted for the high and low performing BP farmers under specific types of relationships. Where appropriate direct quotes from the study participants were used to support inferences drawn from the data.

RESULTS

Actors and their activities

The BP sector was the main livestock activity in the study area with the indigenous chicken being the most popular. About 90% of households in both communities were involved in chicken production. The other poultry species reared included guinea fowls, pigeon and ducks all of which were of less significance. Both genders were involved but men were more dominant in ownership and management of BP as indicated by the 70-90% of men in the sample frames provided by the key informants of the two study communities.

Input supply actors: Actors for the input supply function included vendors of basket cages, starter chickens and veterinary drugs. The basket cages were hand woven, using palm fronds, by a local artisan who sold them on demand to the BP farmers in both study communities. The basket cages were used for transporting live chickens. Starter chickens were supplied by various sources as described by one BP farmer during the focus group discussions: *'We get our starter chickens from friends, relatives, inherited property, by barter and from the market'*. Within the communities, starter chickens were also occasionally supplied by itinerant traders who obtained them from commercial poultry farms.

Production function actors: These were the BP farmers. For all the BP farmers in the study, BP production was a subsidiary income generation activity to supplement their primary livelihood activity which was crop farming. The predominant management system practiced was an extensive oriented system in which chickens are left to scavenge. In the words of one of the BP farmers supported by all members of the group:

“We are crop farmers and have to go to the farm every day because we do not depend on BP rearing as a full time job. The chickens must therefore fend for themselves when we are doing our farm work”.

Some farmers, however, adopt an intensive system temporarily with newly hatched chickens by confining and feeding them on grain and termites for a few days before allowing them to scavenge. Other ways of providing extra care for newly hatched chicks and their mothers included taking them along to the farms as described in one of the focus groups:

“Some of us put our newly hatched chickens and their “mothers” in the basket coops, tie them to our bicycles and take them to the farm. On the farm, we release the hens and the chicks to feed uncooked cassava that we cut up for them, and on anything else they can find as they roam about. They feed on insects, worms and whatever else they can find. We put the chickens back into the basket coops at the end of the day’s work and return home with them”.

Marketing function actors: These included itinerant traders in the communities and traders at the market centers. The former purchased chickens from farmers in the communities and sold them to the traders at the market centers or directly to traders in the consumption function. Besides the village itinerant traders, market center BP traders also sourced chickens and eggs directly from the community BP producers and or travelled to the Northern regions of the country to purchase them. The need to travel to the Northern region was explained by one key informant:

“We do not get enough chickens to buy in Techiman in order to remain in business and even the few that we manage to get are sometimes so expensive that we are unable to sell and make profit. We therefore have to go to the North almost every week where it is cheaper and easier to source chickens in bulk for sale in Techiman”.

Consumption function actors: These included local restaurants, called *chop bars* that specialized in local dishes; charcoal grilled meat sellers, commonly referred to as *kebab sellers* who sold grilled meats in the open; and households that purchased chicken for household consumption. Backyard Poultry (BP) was preferred by these users because of preference for the taste and toughness of the meat of BP to withstand the long cooking methods used in preparing local dishes. Additional actors in the consumption function were traditionalists and their patrons who purchased local hens for ritualistic sacrifices.

Support institutions: All the support institutions identified were involved in activities across various functional domains and actors in the BP value chain. The MoFA provided financial and technical services to producers and marketers whilst the local

government and traditional (community chiefs and elders) administration provided industry policy guidelines and security referred to as enabling environment.

The MoFA also provided annual chicken vaccinations against Newcastle disease. At the time of the study, the MoFA had only one technical staff person operating in the two study communities. The local enabling environment was facilitated by the local government through provision of market infrastructure for the chicken trade and by the traditional administration which delivered justice in BP related disputes.

Relationships among actors

Actors at each functional level of the BP value chain were vertically linked to successive levels through supply and demand exchanges. The input suppliers sold inputs to BP farmers in the production function who in turn supplied the actors in the market function with products which were supplied to the consumption function actors. Horizontal linkages also existed between the actors within the marketing function. Support institutions had multiple linkages with actors in the different functional levels.

The local backyard poultry value chain map

The local BP value chain map that emerged from the above descriptions of actors, their activities and relationships, as well as the support institutions is portrayed in Figure 2. The map depicts the actors identified at each functional level of the value chain, their vertical and horizontal relationships and associated support institutions. Vertical linkages between the actors at each of the four functional levels served to push products of the BP enterprises to the end markets of the consumption function.

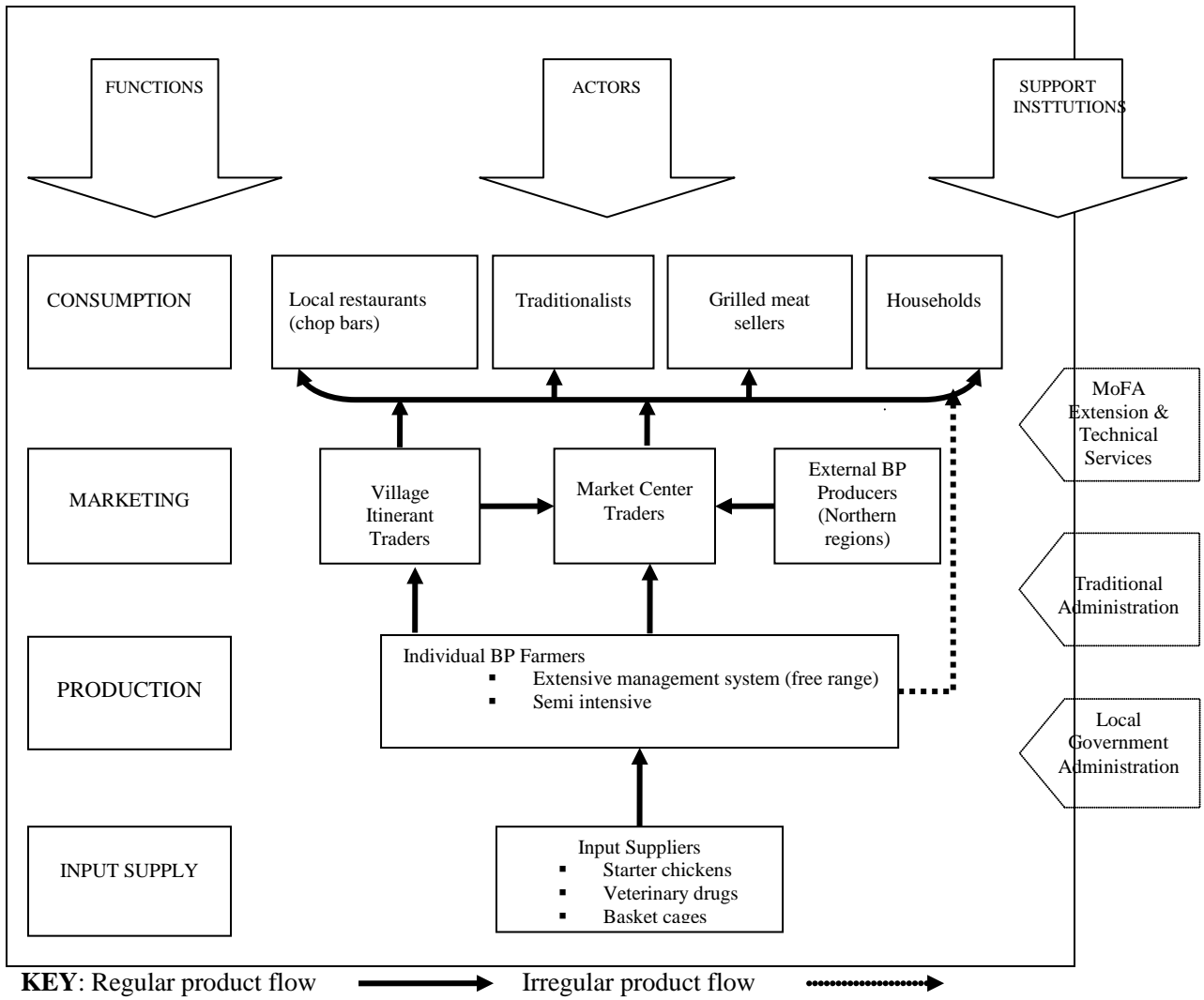


Figure 2: The backyard poultry value chain schematic map for the study area

Performance analysis

Output measures such as customer responsiveness on the quality and quantity of product produced are important parameters for assessing performance in the value chain [13]. While some output performance measures, such as number of items produced, production time, and number of on-time deliveries of ordered products, are easily quantifiable, others such as customer satisfaction and perceptions of product quality, are more difficult to express numerically. Another strategy for assessing performance is competitiveness ranking of products where rival products are ranked using quality concept indexes. The use of competitiveness ranking as a performance indicator is advantageous in that it can reveal opportunities for improvement along the value chain [13]. In this study, the output and competitiveness ranking of the BP industry was used to measure its performance.

A comparison of the production practices of the high and low performance BP farmers and their interactions with actors along the value chain provided indications of the factors associated with higher performance. At the production level, it was found that high performing BP farmers primarily adopted a semi-intensive management system that involved age group separation of birds at roosting; special care for chick; regular provision of supplementary feed; and disease control efforts (usually using herbs and other local concoctions). In contrast, low performing BP farmers relied primarily on an extensive or 'free range' system with little disease control efforts. The outcome was that high performing BP farmers had more chickens survive per hatch and were able to sustain year round production compared to mostly seasonal production among low performance farmers due to higher mortality rates among their birds. At the input supply level, both high and low performing BP farmers secured and reared indigenous chicken breeds with only occasional production of improved breeds. However, the use of basket coops for housing and transporting chickens was more commonly practiced by the high performing BP farmers. On the whole, low performance BP farmers exhibited a nonchalant attitude towards their poultry rearing activities while the high performance farmers attached more importance to the enterprise as a supplementary income source. Village itinerant traders were markets for both high and low performance BP farmers. However, unlike the low performance BP farmers, high performance BP farmers also occasionally sold live chickens to market center vendors. At the consumption level, it was found that production levels of BP among both groups of farmers were generally insufficient to meet market demand. Furthermore, poor product quality was an important concern.

Analysis of the relationships along the value chain showed that the high performance BP farmers enjoyed vertical mutually beneficial relationships with farmers being able to negotiate on price of the cages which were exchanged for cash or foodstuffs. With actors in the marketing domain however, negotiations were minimal with traders dictating the price they will pay for chickens. One BP farmer lamented:

"Since we sell individually to buyers, we are always taken advantage of. The buyer can give all kinds of excuses including low prices offered by other farmers to push down the prices we offer for our chickens to ridiculously low prices...and we cannot do anything about it".

In times of disease, the BP farmers were abandoned, making them feel exploited and helpless. Further, farmer to farmer interactions in relation to BP activities were limited because of mistrust amongst themselves. In general, interactions with support institutions were minimal across the two groups of farmers. High performance BP farmers had irregular interactions with the extension services of MoFA characterized by occasional requests for veterinary services and poultry management information. Low performance farmers rarely interacted with MoFA.

Industry opportunities and constraints

Ghana imports over 44,000 metric tonnes of chicken meat annually [7]. If the average dressed weight of chicken is 0.9 kg, this translates into almost thirty-nine million extra chickens that are required to augment domestic supplies if import substitution

with local production is considered. Potential exists for the BP production sector to narrow the gap between supply and demand for poultry products in the country. Production activities in the BP value chain have the advantage of being essentially self-financing and, therefore, its expansion would require minimal dependence on external funding. Furthermore, the human resource capacity for the sector already exists. In 2007, the Ghana labour force was estimated to be 11.9 million people, 55% of which were small landholders [14]. If 90% of these landholders produce BP, then they would be required to increase their holdings of chickens by 50% in order to produce enough chickens to make import substitution possible.

Meanwhile, the competitive ranking of poultry and poultry meat shows that the BP has some unique qualities of toughness, traditional rituals suitability and taste that make it the preferred chicken meat in the country (Figure 3). Another advantage is the availability of agricultural research and biotechnology institutions in the country to research into genetically improved local chicken breeds that will meet the relevant quality demands of the BP market to enhance its competitiveness.

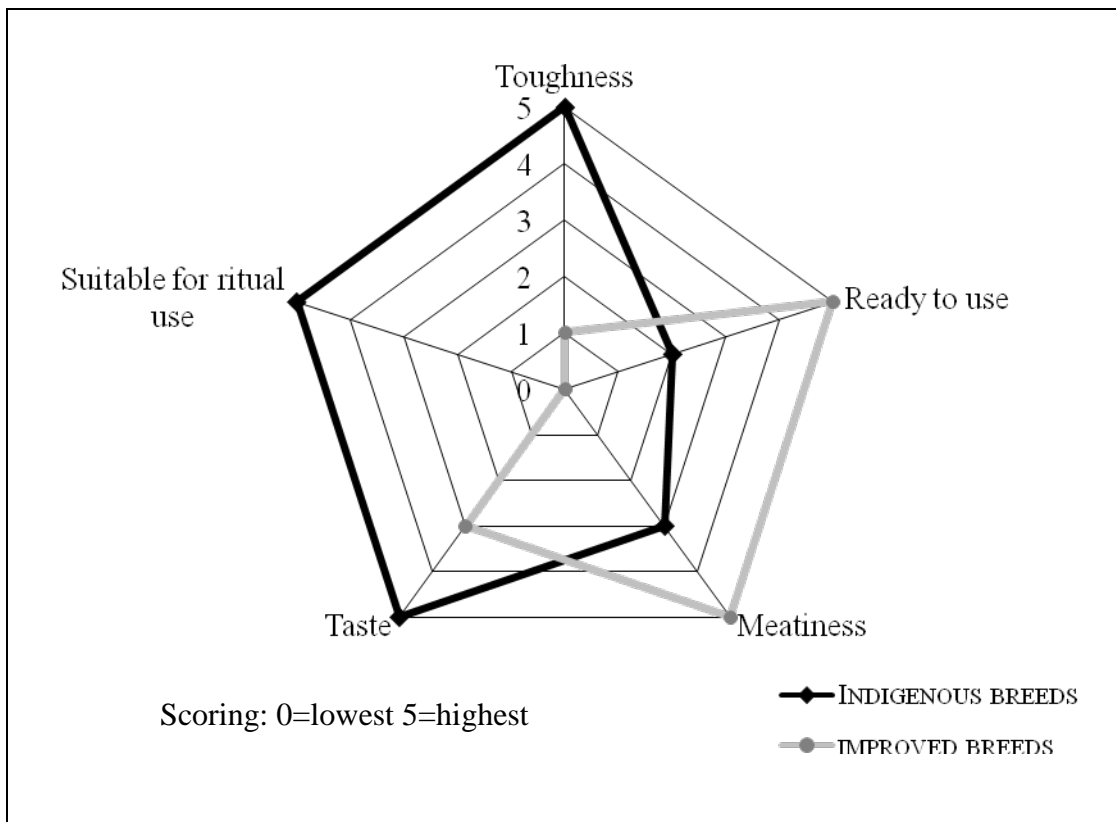


Figure 3: The competitiveness ranking of chicken/chicken products

DISCUSSION

The main findings of the study are that the performances of the BP enterprises are largely related to level of inputs used and intensity of production activities. Further, high BP enterprise performance was characterized by stronger links between BP

producers and suppliers. However, not all vertical relationships were mutually beneficial. The producer-buyer relationship was largely buyer driven and involved *ad-hoc* trading which weakened chain relations (business relations between the various actors in the value chain) and market institutions (market information, standardization, contract enforcement, and financial services), and therefore performance [15]. Despite these challenges, there is opportunity for import substitution with BP given the huge local demand for chicken meat and the competitive advantage that BP has with respect to its taste and texture and with the added preference for local chickens for use in traditional rituals. Additionally, human resources for expansion of the BP sector are readily available as well as scientific and technical support for breed improvement and effective production management. Nonetheless there are institutional constraints. The observed lack of a facilitating organization to coordinate and negotiate activities among the BP farmers and between BP farmers and the relevant actors and or support institutions, greatly hinders the capacity of the BP sector to capitalize on its strengths and seize the opportunity for import substitution.

The finding that the BP enterprise performance is linked to level of inputs used and the intensity of production activities is not unique to this study. Other studies on the BP industry found BP enterprises to be less business oriented and, therefore, weak and undeveloped [16]. The average size of holdings in this study (10-20 birds) is similar to what has been reported by authors on BP activities [6, 17, 18]. The production link was also observed to be the weakest link as its poor performance influenced the entire chain. In a value chain study in Kenya's Kilifi and Kwale Districts, the BP production was reported to be the weakest hub [17]. It has been established that improving BP management has a significant influence on the reduction of chick mortality [19]. Reduction in chick mortality also means higher production efficiency, one of the strategies for gaining a competitive advantage over rivals [10].

In the Morogoro region of central Tanzania, a mutually beneficial collaborative partnership that was reportedly forged between sugarcane producers and millers resulted in improved financial gains to the producers and sustained supplies to millers, supporting the finding that performance is positively related to vertical mutual collaborative relationships between BP producers and suppliers [20]. Actors in such partnerships recognized that they depended on one another for survival, and therefore they treated each other fairly. Through the use of the basket cages, the high performing BP farmers took better care of their chicks and increased their survival rates, thus performed better. Porter also noted that business linkages represent strategic collaboration between companies in order to satisfy specific long-term market objectives which bring mutual benefits to stakeholders [21].

Although active vertical collaboration between the BP producers and marketing actors took place, the relationship was not mutual. The traders dictated prices for chickens and in times of disease, the BP farmers were abandoned. The same observation was made about small-scale mango farmers in Kenya who sold small amounts of produce to local traders who proved to be unreliable [20]. In this study, the traders offered low,

unstable prices and took unpredictable amounts of produce. Because the BP farmers are unorganized they are unable to take advantage of the power of collective organization to improve their bargaining power in price negotiations [15].

Opportunity for import substitution exists because the competitiveness ranking of chicken and chicken meat shows that the BP offers some unique qualities that make it the preferred Ghanaian meat. These unique qualities create competitive advantages for BP. There is also an opportunity for Ghana research institutions to genetically improve the BP. In India, the development of the Kuroiler breed of BP was done for faster growth and higher egg production while retaining valued indigenous characteristics [9].

The findings of this study suggest that the industry must overcome some constraints in order for it to take advantage of available opportunities. The lack of organization of activities among the BP farmers on one hand, and between them and other actors, on the other hand, is a major constraint. A collective organization of BP farmers could improve product quantity and quality through information sharing, collective interaction with service providers, joint disease control and collaborative marketing for better prices. There is also an absence of a processing function on the BP value chain map (Figure 2). That implies that BP meat cannot be presented to the consumers in ready-to-use form which reduces the time for meal preparation. This creates a lower demand for BP than the imported chicken meat. However, by adding value to the chickens through processing, BP producers could not only meet market demands but the meat could also be preserved to meet year-round needs.

CONCLUSION

This study explored the BP value chain with regard to how the activities and relationships of the actors influence the performance of the industry. This knowledge could potentially increase the efficiency of the BP industry for the large number of BP farmers, including women. The BP industry, which tends to be a part-time activity, was generally found to be less business-oriented and undeveloped. The general low production and disregard for market demands by industry actors have negative influences on performance. These factors make the industry less competitive as products do not match consumers' demands. A collective strengthening of chain relations of BP actors and market institutions, currently absent in the industry, could improve product quantity and quality through information sharing, collective interaction with support institutions and joint disease control; and better prices through collective marketing.

The findings from this study suggest that efforts to advance the development of the BP sector in Ghana, will require a shift in development orientation based on the assumption that improved technical efficiency is in itself a sufficient outcome. Attention to human relationships and organizational processes that play important roles in the BP enterprise are critical. This is consistent with current thinking on agricultural innovation in which innovation is seen as an embodiment of technical, social organizational and institutional change [8]. In conclusion, sustainable

improvements in the BP sector must address organizational as well as technical components, with schemes that promote and improve the social integration of the entire BP enterprise sector. Strengthening relationships among value chain actors and building up market institutions to support trading (15) will be important components of the future development agenda.

RECOMMENDATIONS

The findings given above suggest a major policy implication for policy makers within the agricultural sector of the country. The high prevalence of mainly private entrepreneurs in the BP industry implies that improving the functioning of the BP value chain should enhance the performance of the industry. This can be achieved through the following interventions:

1. Improve infrastructure such as processing, transportation, marketing and storage facilities for BP development
2. Provide easy access to private capital to entrepreneurs in the BP industry to facilitate the funding of private enterprises
3. Strengthening the support institutions to provide adequate information to the BP enterprises to ensure industry efficiency and also facilitate the organization of the BP entrepreneurs to coordinate and negotiate activities among themselves and with related support institutions.

ACKNOWLEDGEMENTS

This research study and publication was made possible through partial support provided to the Global Livestock Collaborative Research Support Program by the Office of Agriculture, Bureau for Economic Growth, Agriculture and Trade, United States Agency for International Development (USAID) under terms of Grant No. PCE-G-00-98-00036-00. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the USAID.

REFERENCES

1. **Awuni JA, Coleman TK and VB Sedor** Comprehensive approach to the improvement of rural poultry production in Ghana. **In:** Improving Farmyard poultry production in Africa: Interventions and their economic assessment. FAO/ IAEA, Vienna, 2006: 84-89.
2. **Gibson RS, Yeudall F, Drost N, Mtitimuni BM and TR Cullinan** Experiences of a community-based dietary intervention to enhance micronutrient adequacy of diets low in animal source foods and high in phytate: A case study in rural Malawian children. *J. Nutr.* 2003;**133**: 3992S-3999S.
3. **Siekman JH, Allen LH, Bwibo NO, Demment MW, Murphy SP and CG Neumann** Micronutrient status of Kenyan school children: response to meat, milk, or energy supplementation. *J. Nutr.* 2003;**133**: 3972S–3980S.
4. **Kitalyi AJ** Village chicken production systems in rural Africa. Household food security and gender issues. FAO Animal Production Health paper 1998; **142**.
5. **Aning KG** The structure and importance of the commercial and village based poultry in Ghana. Final Review Report. FAO, Rome, 2006.
6. **Aboe PAT, Boa-Amponsem K, Butler EA, Okantah SA, Dorward PT and MJ Bryant** Free-range village chickens on the Accra Plains, Ghana: Their husbandry and Productivity. *Trop Anim Health Prod* 2006; **38**: 235 – 248.
7. **Ministry of Food and Agriculture.** Imports of meat and meat product through Temaharbour (2001-2006). Livestock Planning and Information Unit of MoFA, Accra, Ghana, 2007.
8. **Leeuwis C** Communication for rural innovation: Rethinking agricultural extension. Blackwell Science Ltd, Oxford, 2004.
9. **Ahuja V and A Sen** Scope and space for small scale poultry production in developing countries. IIMA-380 015, India, 2007.
10. **USAID.** Key Elements of the Value Chain Approach. Briefing Paper, 2007.
11. **Alvarado I, Molina K and E Ac Bol** Determination of the competitiveness linkages through the agricultural associative enterprises: The case of the communities on the Parismina River basin in Costa Rica. *Ecol. Eng.* 2008; **34**: 373-381.
12. **Patton MQ** Qualitative Evaluation and Research Methods. 3rd Ed. Thousand Oaks, CA: Sage, 2001.

13. **Beamon BM** Measuring supply chain performance. *Int. J. Oper. Prod. Manag.* 1999; **19(3)**: 275-292.
14. **CIA.** The World Fact Book. Washington D.C., CIA, 2009.
15. **KIT and IIRR.** Trading up: Building cooperation between farmers and traders in Africa. Royal Tropical Institute, Amsterdam; and International Institute of Rural Reconstruction, Nairobi, 2008.
16. **Ministry of Food and Agriculture.** Ministry of Food and Agriculture Livestock Development in Ghana: Policies and strategies. Jointly prepared by the Animal Production Directorate, Veterinary services Directorate and Livestock Planning and Information Unit. Accra, 2004.
17. **Mathuva JM** Value chain analysis of the indigenous poultry sub-sector, Kilifi and Kwale districts – Kenya. Final report presented to Rural Enterprise Development/Coastal Rural Support Programme. Kenya, 2005.
18. **Mwalusanya NA, Katule AM, Mutayoba SK and MMA Mtambo** Productivity of local chickens under village management conditions. *Trop. Anim. Health Prod.* 2002; **34**: 405-416.
19. **Dwinger RH and H Unger** Summary of the results of the FAO/IAEA Coordinated Research Project Assessment of the effectiveness of vaccination strategies against Newcastle disease and Gumboro disease using immunoassay-based technologies for increasing farmyard poultry production in Africa. In: Improving farmyard poultry production in Africa: Interventions and their economic assessment. IAEA, Vienna, 2006: 1-9.
20. **KIT, Faida Mali and IIRR** Chain Empowerment: Supporting African Farmers to Develop Markets. Royal Tropical Institute, Amsterdam, 2006.
21. **Porter M** Competitive Advantage: Creating and sustaining superior performance. New York: The Free Press, 1980.