
Biosecurity Factors Informing Consumer Preferences for Indigenous Chicken: A Literature Review

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ABSTRACT

Indigenous chicken sector exhibits a very low adoption of biosecurity practices, thus is highly precarious in the wake of avian disease outbreak. Consumer preferences on the other hand seem strong for this chicken category and it is unknown whether knowledge of the state of the sector in terms of biosecurity informs consumer's preferences for the product category. Other factors include communicating biosecurity messages, food security, gender equity, chicken factors and consumer profiles. The study utilizes desk research to review literature on biosecurity factors that inform consumer preferences for indigenous chicken. The importance of considering these factors is demonstrated in programming sector-wide biosecurity measures to jumpstart the sector with potential of eliminating poverty, food insecurity and improving livelihoods among rural folks.

Keywords: *Biosecurity, gender equity, consumer preferences, chicken*

1. INTRODUCTION

Poultry is an alternative to rural livelihoods positively impacting national and regional food chains (Sørensen, 2006; Bishop, 1998). Demographic changes and increasing consumer sovereignty are important trends in agro-food systems that agribusinesses must harness. With increased urbanization and growing household incomes, preferences tend to change thereby motivating new opportunities to be exploited (World Bank, 2003; Nyoro and Ngugi, 2007). One such trend is preference for lean white meat. Fish and poultry are the most preferred since captured fishery resources are dwindling and aquaculture is still at an introductory stage of mass exploitation in Kenya. Moreover, exotic poultry is not entirely lean and thus leaving indigenous chicken as the other alternative (Nyaga, 2007). Consumers generally prefer indigenous to exotic bird breeds in the East African region (USAID, 2010a). Poultry meat is the fastest growing component of global meat production, consumption, and trade, with developing and transition economies contributing a leading role in the expansion. In addition to providing opportunities to increase poultry exports, rising poultry production spurs growth in global import demand for feeds and other inputs which give rise to investment opportunities in these sectors. (Landes et al., 2004). The society expects the livestock sector, poultry included, to continue to meet rising world demand for animal products cheaply, quickly and safely (FAO, 2009). Increasing access to affordable animal-based foods could thus significantly improve nutritional status and health for many poor people.

Kenya National Poultry Improvement Program (KNPIP, 2010) was created within the Ministry of Livestock to promote competitiveness of Kenya poultry products. It seeks to improve livelihoods of about 21 million small holder poultry farmers in rural Kenya and to promote infrastructural development in the poultry industry by promoting private investments. The indigenous chicken sector is however weighed down by countless challenges including slow growth varieties, high mortality rates, predation, a disorganized industry and technological concerns. Thus KNPIP provides avenues within the poultry value chains that private investors and

development partners to invest in the sector. The demand increase for poultry products due to population growth, urbanization and increase in per capita income for the middle class will lead to increased producer income due to the elastic nature of the demand (USAID, 2010a). The significance of indigenous chicken has, however, escaped major agribusinesses in the chicken chain since the resultant production and marketing systems has remained largely rudimentary. Value-added chicken products can promise optimal poverty alleviation and job creation. The challenge is how to develop the potential of this highly fragmented and uncoordinated indigenous chicken sub-sector. Agricultural marketing, being the main driving force of agricultural economic development, can specify the solution to this situation since it has a guiding and simulating impact on production and distribution of agricultural produce (Rouse and Davis, 2004).

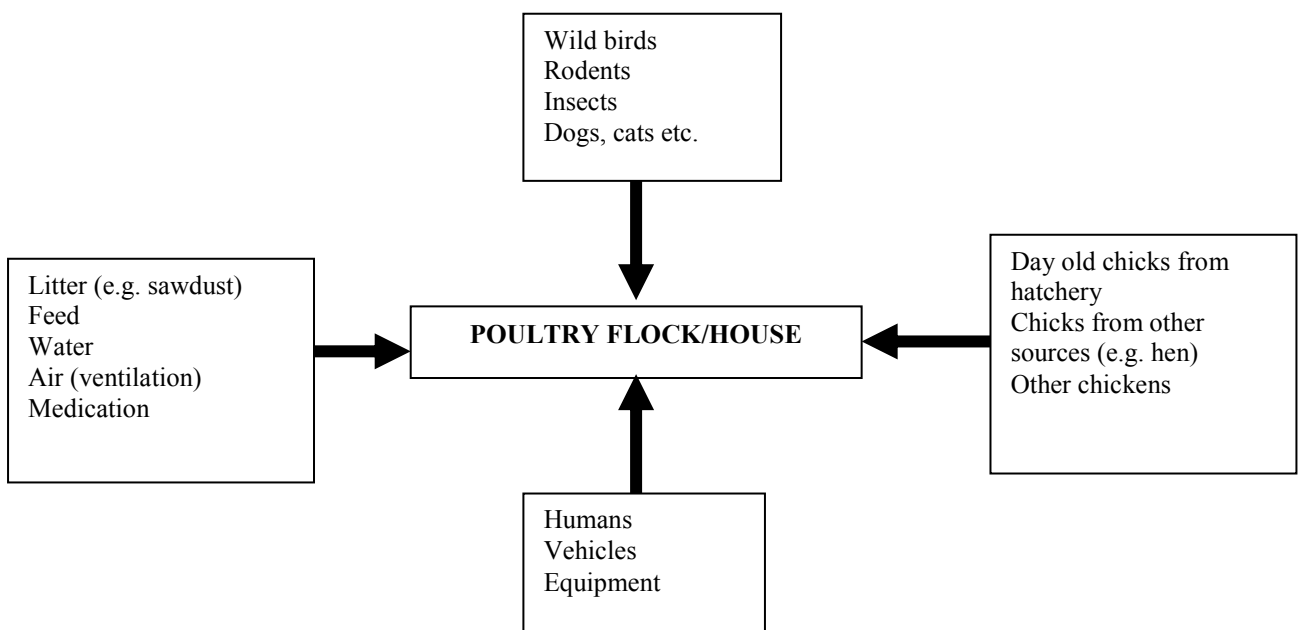
The study sought to appraise the state of knowledge on indigenous chicken biosecurity factors and how they function to influence consumer preferences. Other factors such as food security, gender and chicken factors are also reviewed.

2. BIOSECURITY FACTORS AND PRACTICES

Biosecurity means the safety of live things, or the freedom from concern for sickness and disease (Amass and Clark, 1999). It is the security from transmission of infectious diseases, parasites and pests to a poultry production unit (Permin and Detmer, 2007) and can be seen as a set of preventive measures designed to reduce the risk of transmission of infectious diseases, quarantined pests, invasive alien species, and living modified organisms (Aila et al., 2011a; 2011b). Practical biosecurity must be developed by producers in order to prevent entry of diseases to the flock and is a tool to minimize the effect of infections and decrease the impact of disease. Biosecurity must maintain tangible measures such as locks on gates, visitors, showers, disinfection points, policies, protocols, quarantine rules, vaccination programmes and other preventive treatment measures (Henson and Jaffee, 2005).

Permin and Detmer (2007) developed a biosecurity model with the poultry flock/house at the epicenter and biosecurity measures safeguarded by ensuring poultry feeds are free of pathogens and mycotoxins. Water, air, medication and litter material equally must be clean and permit no entry of pathogens. Humans, vehicles and equipment entering and/or leaving the poultry unit must be disinfected thoroughly and lastly, day old chicks from hatchery, chicks from other sources (e.g. hen) and other chickens must be from secure sources and separated by age.

Fig. 1: An overview of a biosecurity model



Source: Permin and Detmer (2007). *Improvement of management and biosecurity practices in smallholder producers*. Rome: Food and Agricultural Organization of the United Nations

Elbakidze (2003) notes that three mitigation measures of agricultural terrorism are prevention; detection and response; control and repair. Some methods of enhancing control and repair include reducing access to chemical and biological materials; increasing security measures at central production, processing and distribution facilities; employee screening; using antimicrobial drugs and vaccination; enhancing and updating sanitary standards at production, transportation, storage and retail facilities; and establishing and/or imposing detection, surveillance and tracing. Lovett (2005) included surveillance, detection, diagnostics, preparedness, and rapid response as principles in biosecurity management.

Nyaga (2007) documented Food and Agriculture Organizations (FAO) four poultry production systems in Kenya as firstly, industrial integrated systems with high level of biosecurity and birds/products marketed commercially; secondly, poultry production systems for instance, farms with birds kept indoors continuously, strictly preventing contact with other poultry or wildlife; thirdly, commercial poultry production system with low to minimal biosecurity and birds/products entering live bird markets, for instance, a caged layer farm with birds in open sheds, a farm with poultry spending time outside the shed, a farm producing chickens and waterfowl; fourthly, village or backyard production with minimal biosecurity and birds consumed locally, indigenous chicken falls within this sector which has high risk levels of biosecurity.

Western Kenya, for instance, with high population concentrations for humans and poultry, low hygiene standards, and a culture that promotes close contact with chicken poses very high biosecurity challenges especially during avian disease outbreaks (Njue et al, 2002). Gueye (2002) asserts that there are usually humanized relationships between humans and poultry since small poultry flocks are kept by producers, consequently humans and poultry often live in the same house.

2.1 Indigenous chicken and the biosecurity debate

Indigenous chickens sector has the potential to improve livelihoods of many rural folks in Sub Saharan Africa and many developing worlds. Ahlers, et al (2009) emphasize that poultry has contributed to human health and wellbeing for millennia. For rural communities, poultry continue to be an integral part of farming systems and household economies while for cities and towns, large and small scale commercial poultry industries perform a critical role in providing safe, good-quality products for urban consumers. In many countries, commercial and household poultry are located within the same communities, thus improvement programs designed to increase the capacity of producers and introduce new technologies or practices can have widespread impact.

Muteia et al., (2011) observes that the majority of the farmers surveyed lost more than 50% of their monthly poultry income at the onset of the avian influenza crisis. However, the most severely affected group of poultry farmers are the smallholders, where about 21% of them lost between 80 to 100% of their annual poultry income. The disease outbreak led to a significant reduction in poultry employment across the country. Lower recovery rate of 56% were observed among the smallholders as compared to the commercial recovery rate of 103%. Thus, the risks associated with biosecurity lapse could result in farmers losing their entire flocks or recover from the loss at a very low rate.

The production, processing, trade and consumption tendencies for indigenous chicken reveals that poultry class is not entirely biosecure and can be devastating to the industry in case of an avian outbreak (Nyaga, 2007; Njue, et al, 2002; Omiti, 2010; Aini, 2000). KNPIP (2010) proposes a public-private partnership in addressing the trials of the sector. At stake is the livelihood of over 21 million people in Kenya and the debate within the poultry sector has a strong emphasis in making the indigenous sector biosecure, efficient and productive.

USAID (2010b) reveals that the indigenous chicken sector constitutes over 99% of all poultry produced and consumed Ethiopia. Even though the sector is not highly integrated, the particular preference for indigenous country cannot be contradicted. In terms of biosecurity, the backyard poultry producers use inputs with little or minimum external inputs, which include poor quality feed; mixed cereals; local breeds sometimes combined with improved breeds obtained from extension services or neighboring farmers; minimal veterinary services from Bureau of Agriculture; local labour and traditional housing systems.

The production system is based on scavenging by indigenous chickens left to search for their own food, scratching and picking on the ground while only small amounts of grains or kitchen leftovers are provided. The households provide overnight housing for the chickens outside the main house and the house is cleaned in three to four day intervals. Dead chickens are taken some distance away from the house for disposal and eaten up by

wild animals or even domestic animals such as dogs. Such traditional poultry practices are widely common with the backyard producers (USAID, 2010b). On average poultry eggs and meat consumption is estimated at 69,000 tons and 77,000 tons per annum respectively and 99% of the products are raised by smallholder farmers.

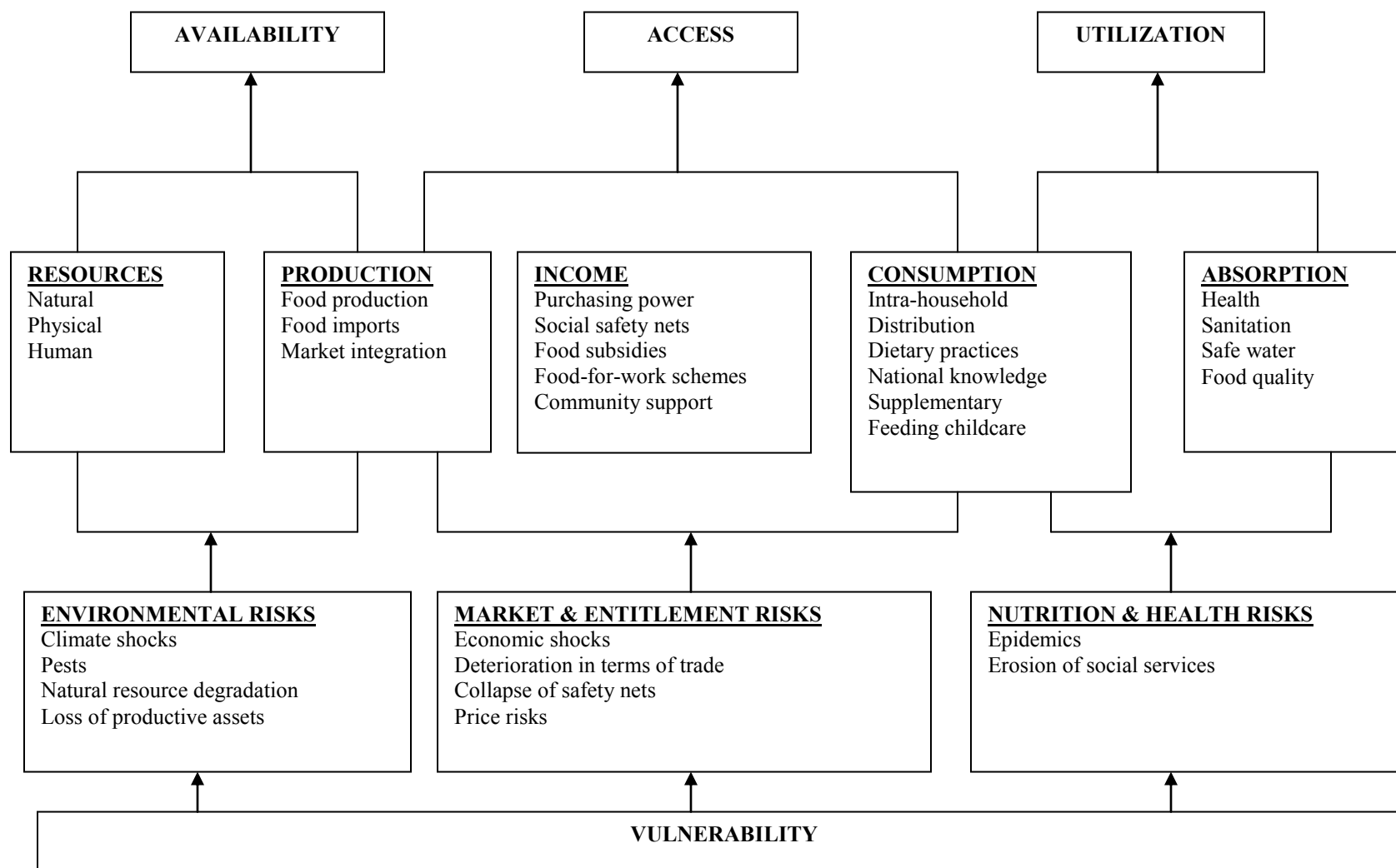
Nerlich et al. (2007) indicate that implementing biosecurity measures around entrances of big industrial poultry farm is not only effective in terms of any microbiological effect but it also impresses the big supermarkets and sends out the right message. It has a symbolic and in a way, ceremonial function. Small producers regarded as the weak link in the UK poultry industry and in the disease control chain are keen on sending the message that they are not entirely the culprits. Moreover their birds are not stressed out, have a better immune system and are juicy. Mwanza (2009) contends that due to the fragmented nature of the smallholder broiler meat chain, ensuring food safety control has been a challenging task. Thus, as current animal production methods cannot be expected to achieve a zero risk, the need for risk reduction and where possible elimination 'on the farm stage is required. Hence assessments of food safety risks have to begin at the farm, since farm activities greatly influence the processing and distribution of food.

Van der Valk (2008) asserts that the poultry sub-sector is an important livestock enterprise, especially in the rural households as it directly supports the livelihoods of thousands of Kenyans. The sub-sector is a major source of readily available proteins in form of eggs and meat and a source of livelihood for 90% of the rural households. The mean annual poultry meat production is estimated at 18,600 metric tonnes valued at KES 3.5 billion, while the annual egg production is around 1.2 billion eggs, valued at KES 9.7 billion.

In the U.S.A., village poultry is promoted as "pastured" poultry which is a niche market whereby some consumers are willing to pay more for what many of them consider being testier, healthier and more humanely grown chicken (Fanatico, 2010). For consumers natural poultry usually includes flocks of chickens that roam on grassy pasture and eat only non-medicated feeds that do not contain unappealing by-products. The belief is that pastured poultry delivers better nutrition and taste. Consumers further exhibit other reasons for their preferences including nostalgia from a cultural perspective; welfare and aesthetic reasons; environmental soundness and for community action.

According to Pica-Caimarra and Otte (2009) investment in backyard poultry farming could thus enhance nutrition by reducing the vulnerability of landless, marginal and small-scale farmers, but does not appear to be a promising strategy to achieve widespread poverty reduction and stimulate equitable growth in rural areas. Poultry farming serves as an inexpensive device for households to generate highly nutritious food items at minimal cost, because of the low input requirements and the low opportunity cost of family labour allocated to poultry care.

Fig. 2: Dimensions of food security



Source: Singh, R.B. (2008). *Biosecurity for food security*. Synthesis paper from paper presented to National Commission on Farmers, 2006, South Asian Conference, 2008, and Memorial Lecture, 2008.

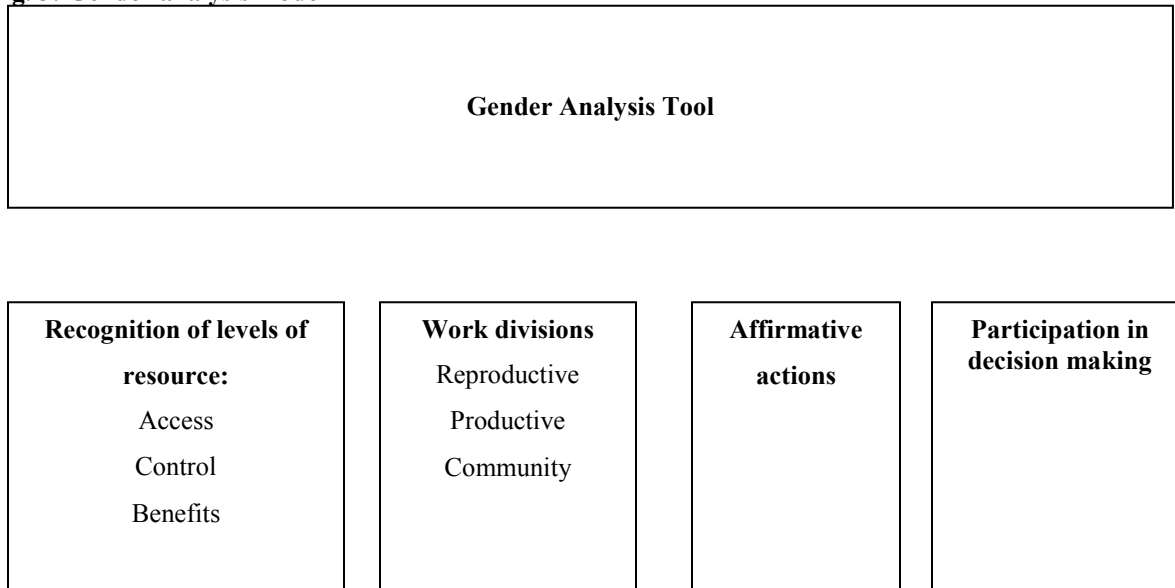
2.2 Indigenous chicken and gender equity

Guiselle et al. (2004) suggest that gender is utilized to designate social relations between sexes and is a way of making reference to social constructions, the social origin of masculine and feminine identities. Gender refers to the attributes and opportunities associated to being a woman or man and the relations with each other. These attributes, opportunities and relations are socially built and learned through the socialization process and as such they are dynamic, changing, and may, therefore, be modified. Differences and inequalities exist in most societies regarding the activities carried out by men and women in connection with the access and control of the resources, as well as the decision-making venues. Gender is part of a more complex social interweaving, and interacts with factors such as socio-economic condition, race and age.

Bifani (2003) illustrates that when referring to gender generally implies the fixed and unchanging character about what men and women are, including what they should do within the household and society in general. Such characteristics and roles are social constructions, and may be changed. Consequently, the adoption of the gender equity approach implies focusing on women and men, including their relations with each other and the natural resources. This approach seeks to avoid the prevalence of limitations or restrictions based on sexual differences in connection with the access to resources and opportunities.

Gender equity promotes the elimination of economic, political and educational barriers as well as the access to basic services such that men and women may enjoy equal opportunities and equitable benefits. Gender equity and equality are conditions that should be promoted on an ongoing basis, as the progress achieved may easily be eroded, for which reason the actions promoting more equitable power relations should be steadily and sustainably pursued (Guiselle, et al, 2004).

Fig. 3: Gender analysis model



Source: Adapted and modified from Guiselle, V.R., Cascante, F.A. and Lobo, M.B. (2004). *Diversity makes the difference: actions to guarantee gender equity in the application of the Convention on Biological Diversity*. World Conservation Union – IUCN. ED Absoluto, San José, C.R.

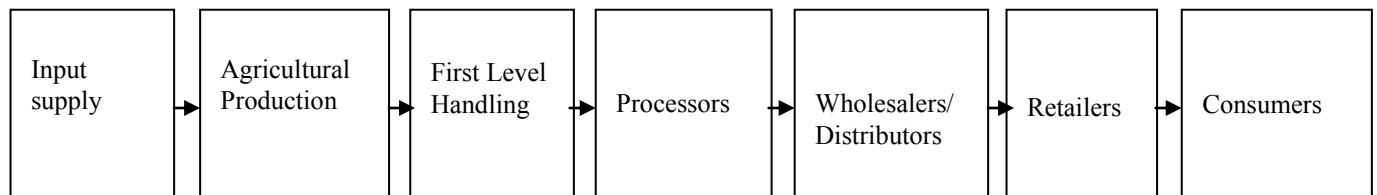
Guiselle, et al, (2004) proposed a gender analysis model that integrates access, control and benefits of resources differentiated by gender, work divisions, affirmative actions and participation in decision making. This gender analysis tool provides an insight into how gender equity might influence consumer preferences for indigenous chicken. Velasco et al., (2008) reports that the widespread acknowledgment of the key roles of women, particularly in small scale backyard poultry production and marketing, has not really been translated in specifically targeting women as both communicators and as recipients/beneficiaries of avian influenza (AI) campaigns and trainings.

Women poultry keepers rarely receive adequate support and services or resources and training. Neglect of this important production group can aggravate the effects of socio-economic alarms resulting from AI outbreaks.

2.3 Indigenous chicken factors

The key to Value Chain Approach (VCA) is in identifying the various ways in which chicken products reach the consumer. The degree of differentiation that exists between competitors; the economic relationship between the various parties in the value chain; the number and size of the competitors at a particular stage of the value chain; and the importance of economies of scale are factors to consider in any value chain analysis. Economies of scale, for instance, can dictate how processors want to interact with other stakeholders.

Fig. 4: A typical value chain for agricultural products.



Source: Cloy, B. (2005). A guide to understanding the value Chain, *Smart Marketing*, Monthly Marketing Newsletter for Extension Publication, Department of Applied Economics and Management, Cornell University.

Food safety and contamination risk are even more important when a stakeholder has huge economies of scale and thus volume is especially at risk (Cloy, 2005; Mathuva, 2005; Okello et al., 2010). Biological production risk and perishability are frequently important characteristics of agricultural value chains. Biological production uncertainty can have important implications for the consistency of supply-to-supply chain members. This is especially important when there are economies of scale present. Perishability can have important impacts on the logistics and handling of food products. It will also influence the responsiveness of supply and will limit the amount of substitution that can take place when production is reduced. Economic relationships that govern the transactions taking place at each stage of the value chain and key consumer trends and technological advances are equally critical. In agriculture, the development of biotechnology has the potential to dramatically change value chains because it has important implications at both ends of the value chain. Consumer attitudes toward biotechnology will create new niche markets for value chains that either do or do not use biotechnology. Likewise, new products will be developed and potentially create new value chains. Furthermore, biotechnology will impact the role of food processors in the food system, as food products are refined at the genetic rather than the plant level (Cloy, 2005; Gereffi et al. 2005).

The Kenyan poultry industry is characterized by dualism, comprising both smallholder and large-scale poultry producers, with the former forming the majority in terms of population of birds. The industry is characterized by two main production systems namely the commercial hybrid poultry production system and the indigenous poultry production system (Nyange 2000; Kingori et al., 2010). The indigenous poultry production is the dominant poultry production system in Kenya and is concentrated in rural areas and involving 75% of the households. Approximately 71% of eggs and poultry meat in Kenya are derived from indigenous poultry (Republic of Kenya, 2008). Indigenous chicken are predominantly produced in village backyards with little or no biosecurity measures (Nyaga, 2007). The indigenous poultry system is characterized by unconfined birds that scavenge around the homestead and often interact with wild bird species in the process (Republic of Kenya, 2008).

The birds often live in the same house with the owner, or occasionally in separate house/structure. The birds scavenge though some farmers supplement feeding with either supplement or concentrate feeds (USAID, 2010a and b). Little or no veterinary care is given to these birds and due to home consumption, majority of these birds are processed at home within diverse and frequently adverse hygienic conditions. Thus slaughter-house processing is seldom practiced. Municipal processing of birds, for instance, transfers the inherent biosecurity risks from the producer to the processor. Trade in indigenous chicken takes place in live markets usually designated within municipal markets where the birds are transported together with other goods and passengers. A nominal fee is charged on the trader and the buyer selects a bird of his choice then it can be slaughtered there or he takes it live.

Restaurants typically slaughter their own birds at their backyards. Only a limited number of butcheries now carry slaughtered indigenous chickens in the city. The birds are packed in clear plastic bags and consumption is done restaurants, festivals or at home.

Okello et al, (2010) identified that trade in poultry and poultry products in Kenya is characterized by extensive movement of live birds and their products within Kenya (i.e. between regions) and from neighboring countries across the border into Kenya. The dominance of the indigenous poultry production system in Kenya with its limited biosecurity combined with the nature of the poultry trade poses a potentially significant challenge to the design of strategies necessary to prevent possible outbreaks of avian influenza in Kenya. Okello et al (2010) suggests that the value chain analysis shows significant heterogeneity in the types of chains present in the poultry sector in Kenya. Layer and egg value chains tend to be significantly longer and more diffuse than the value chain for broilers and indigenous chickens. For broilers, shorter chains reflect greater integration among stakeholders through contractual (formal and informal) arrangements, while for indigenous poultry; most non-subsistence trade involves direct sales between farmers and buyers (who include other farmers and retailers). Outside of formalized, vertically integrated arrangements, governance relationships are largely informal.

Ayele et al. (2010) explains that the Ethiopian traditional poultry sector is largely characterized as having no backward linkages with the feed grain sector. Moreover, this sector also has weak forward linkages, as only 23% of this sector's output is sold in the local or informal markets or at the farm gate (Alemu et al., 2008). The modern poultry sector in Ethiopia comprises a few small to medium scale semi-commercial producers and even fewer large-scale commercial farms. These producers, especially large-scale farms, have strong backward and forward linkages in the economy. Large-scale commercial poultry farms involve a highly intensive production system with 10,000 or more birds kept under indoor conditions with a medium to high biosecurity level. This system depends heavily on imported exotic breeds that require inputs such as feed, housing, healthcare, and a modern management system (Alemu et al. 2008).

According to Okello et al. (2010), demand for indigenous poultry is high as some consumers prefer indigenous chicken to meat from broilers and layers because, they argue, it tastes better and it is more nutritious. In addition, the cost of producing indigenous chicken is lower due to its alleged higher resistance to diseases (Bebe and Owuor, 2008). Mathuva (2005) indicates that poultry market interaction was characterised by the following functions. Firstly, the production is estimated to consist of 15,800 households and the role of women in poultry management is significant through provision of basic care. Ninety five percent of the poultry in the region is associated with the households; more than ninety percent of the households keep indigenous chicken. Other stakeholders in production are informal breeders who exhibit good practices in production though they only account for three percent of the poultry produced while producer groups take up only two percent.

Secondary bulking and transportation are the second functions and brokers handle 95% of poultry reaching distant traders. Women are quite few in brokerage owing to the heavy burden of the associated tasks (accounting for 17.2%). Broker categories are of two types; village-based brokers responsible for bulking throughout the week, and trading routes-based brokers who act as itinerant traders. Villages-based brokers have comparatively fairer prices and are directly linked to associating traders for which they have supply arrangement. These traders on the other hand extent some credit facilities (though limited) for retention and continuity of the relationship (Mathuva, 2005).

Primary bulking forms the third function and there are about 1.3 brokers per trader of which the proportion of women is higher in the trader category, accounting for about a quarter of all traders. In primary bulking, two categories emerge; Distant traders and Stationary traders. Traders face a number of challenges including double payments to the council, high mortalities of chicken in transit and general high operation costs. The fourth function is transportation and wholesaling where traders involved relies on bicycles, public transport and hand-carts to accomplish the transportation component. Lastly, the function of retailing has differentiated players which consist of distant and stationary traders including all other categories involved in retailing. However, prices vary considerably depending on point of sale within the functional points in the sub-sector map (Mathuva, 2005).

2.4 Profiling the indigenous chicken consumer

Landes, et al. (2004) notes that growth in the Indian poultry industry is driven primarily by gains in real per capita incomes and changes in poultry prices. Current patterns of poultry consumption provide additional evidence of the important roles of income and price. First, poultry consumption is higher in urban areas, where both average incomes and the number of high-income consumers are highest. Second, per capita poultry consumption is higher, perhaps as much as four times higher, in South India where retail poultry prices are significantly lower than in other regions.

Psychographic and sociocultural characteristics describe the members of a target group (Schiffman and Kanuk, 2009). Psychological characteristics refer to the inner qualities of the individual consumer hence they may be segmented in terms of their motivations, personality, perceptions, learning, level of involvement, and attitudes. Psychographic research focuses on the measurement of activities, interests, and opinions. The target group can be segmented on the basis of sociocultural characteristics such as stage in the family lifecycle, social class, core cultural values, subcultural membership and cross-cultural affiliation.

Neo-classical economic theory presents the consumer as a sovereign agent making rational purchasing decisions based on personal preferences relating to personal needs. Strate (2008) proposed that neo-classical economic models and value chain approaches may help indicate the kind of specialty food which succeed or fail and what consumers might be willing to pay (Baltzer, 2004). Consumer preferences alone are not sufficient to explain consumer demand, because both consumers and producers are participants in the processes of qualification of products. Stated preference techniques (Abley, 2000) are market research tools that allow researchers to uncover how consumer's value different product/service attributes. The tools ask respondents to rank, rate or choose between different hypothetical product/service scenarios that are made up of different attribute mixes. The choices made by the respondents can be used to infer how they value different attributes. Green and Srinivasen (1990) defined evaluation techniques as any decompositional method that estimates the structure of a consumer's preference given their overall evaluation of a set of alternatives that are pre-specified in terms of levels of different attributes.

Louviere and Hensher (1983) suggested stated preference techniques and emphasized their use while incorporating choice experiments. The data produced proved easier to analyze, and allowed greater prediction of market shares. Pearmain, et al., (1991) noted that choice-based stated preference techniques are now considered the most commonly used technique. Weerahewa (2004) indicate that consumer preferences for indigenous animals in Sri Lanka confirm a special preference towards indigenous animal products (indigenous chicken eggs, meat, cow's milk curd, cow's milk and ghee in particular) over the exotic equivalent since the products are sold fresh, however sellers do not follow safety standards. Many consumers indicated their willingness to pay an extra amount for these products if they are freely available in the general marketplace.

Bett et al. (2011) estimated the consumers' responsiveness to a premium price and their willingness to pay for the indigenous chicken products in Kenya and revealed that consumers were willing to pay 23.26% per kg more for indigenous chicken meat and 41.53% for eggs.

3. SUMMARY

The study set out to review existing literature on biosecurity factors informing consumer preferences for indigenous chicken. Biosecurity was found to be a new concept within the general population (Amass and Clark, 1999) and thus not clearly understood. Biosecurity practices within the poultry sector tend to concentrate at the poultry unit of production (Permin and Detmer, 2007; Mwanza, 2009) and the practices embraced in the sector favour industrial chicken producers (Nerlich et al., 2007). Indigenous chicken subsector was observed as the weak link within the biosecurity debate since little or no biosecurity was performed in the sector (Nyaga, 2007).

The poultry sector was found to support the livelihoods of many rural folk in Kenya (Van der Valk, 2008) and as Pica-Caimarra and Otte (2009) conclude that investment in indigenous chicken can enhance nutrition and reduce food vulnerabilities. Indigenous chicken offers opportunities to execute gender equity especially for the women folk (Velasco, et al, 2008).

The value chains for indigenous chickens in East Africa are disorganized with no clear investment opportunity for both private and public partnerships. Biosecurity practices were found to be particularly low in all the parts of the value chain for indigenous chicken. Landes, et al., (2004) for instance, indicate that consumer income is a critical profiler in preferences for indigenous chicken. Consumers also exhibited a willingness to pay extra amount for the indigenous products (Weerahewa, 2004; Bett, et al, 2011).

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