

**ASSESSMENT OF PRODUCTION PERFORMANCE AND MARKET CHAINS OF  
VILLAGE CHICKENS IN MERU DISTRICT**

**BY**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE  
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## ABSTRACT

This study was conducted in Meru District, Arusha region. Specifically, the study assessed production performance of VCs; identified market chains and market opportunities; analyzed gross market margins and profit margins at different stages in the market chains. Data were collected from 90 farmers, 78 traders and 33 consumers, who were purposively sampled. Production performance of VCs was computed through descriptive statistics and cross tabulations. Results that indicated the mean eggs laid per hen during dry and wet seasons were  $17.0 \pm 0.5$  and  $12.9 \pm 0.4$  respectively. This difference was statistically significant ( $p < 0.05$ ). Survival rates of chicks 8 – 10 weeks of age were 70.9% during dry season and 67.5% during wet season. Adult's survival rates were 87.4% and 86.1% during wet and dry season respectively. Chick mortalities were due to diseases and predators. Most farmers vaccinated their flocks against Newcastle disease. Market opportunities were identified. Marketing and profit margins were found to vary among different actors along the market chain. The results obtained indicated farmers were adequately rewarded in cocks, hens and eggs but not for growers. Hotels, restaurants/bars obtained higher marketing margins. Consumers were constrained by high price during high price seasons. The study revealed that performance of VCs was good in terms of: average age at first lay ( $5.7 \pm 1.8$  months old), hatchability percent, and adult survival rates. However, performances of VCs were poor in terms of: the number of egg laid per hen per clutch, number of clutches per hen per year, and poor performance in chick survival rates. To sustain and improve productivity it is thus recommended that special support should be provided to enable poor rural VCs producers to expand their production.

## DECLARATION

I, Martha Wilson Ng’wiza, do hereby declare to the Senate of Sokoine University of Agriculture, that this dissertation is my original work and that it has neither been submitted nor being concurrently submitted for degree award in any other institution.

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### LIST OF ABBREVIATIONS

ACIAR	Australian Centre for International Agricultural Research
AICC	Arusha International Conference Centre
BOMIMTO	Swahili acronym standing for <i>Bondeni, Miembeni, Mtoni</i> (combination of the places named after their respective prominent features i.e. around the: Valley, Mango tree, and River respectively).
CRS	Catholic Relief Services
DAD – IS	Domestic Animal Diversity Information System
DADP <sub>s</sub>	District Agricultural Development Plans
FAO	Food and Agriculture Organization of the United Nations
GIT	Gastro Intestinal Tract
Ha	Hector
IAEA	International Atomic Energy Agency
MAC	Ministry of Agriculture and Cooperatives (Tanzania)
MAF	Ministry of Agriculture and Food Security (Tanzania)
MOA	Ministry of Agriculture (Tanzania)
OTC	Ox Tetracycline
RECODA	Research Community and Organizational Development Associates
SFR	Scavenging Feed Resource
SILC	Saving of Internal Landing Communities
SPSS	Statistical Package for Social Sciences
SUA	Sokoine University of Agriculture
TSH	Tanzanian Shillings
UK	United Kingdom
URT	United Republic of Tanzania
VCs	Village Chickens
VICOBA	Village Community Bank

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background Information

According to the Agriculture Sample Census of 2003 as cited by Kulunalila (2006), the estimated population of poultry in Tanzania was 33.3 million of which 31.6 million (94.9%) were indigenous poultry. These statistics show that traditional poultry production system appears to be the largest compared to the commercial poultry production system which is made up by 5.1%.

Kalita *et al.* (2004) contended that the role of Village poultry in resource - poor communities in all countries is still high especially in meeting the demand for meat and eggs for those who live in the villages. Irrespective of different locations in the world and where the scavenging poultry are reared, there are certain aspects that are common. The keepers of scavenging poultry usually maintain a few (2-10) birds; keepers are generally women and children, and they are the poorest people in their communities. Smallholder production of poultry is primarily done in free range where birds receive little or no inputs. These birds are known around the world by different names including family, scavenging, free range, desi, rural backyard poultry and village chickens (VCs). While chickens are the main species, other farmed poultry include ducks, turkeys, guinea fowls, quail and pigeons, with factors such as environment and customs influencing the type of poultry kept.

Productivity of rural poultry depends on the management systems adopted (Guěye, 2003). In general under the scavenging systems whereby the low input - low output is the dominant husbandry system, chickens have low productivity compared to high-input systems. The low output is caused by a number of factors, the most important ones being low genetic potential and sub-optimal management such as: lack of supplementary feeds or

poor feeding, poor disease control, poor housing. Many of these factors can affect the efficiency of rural poultry production either directly or indirectly (Kyvsgaard *et al.*, 1999).

According to Goromela (2009), the indigenous poultry species contribute significantly to household food security and income in Tanzania. Citing the Agriculture Sample Census of 2003, Goromela further explained that chicken production trend in Mainland Tanzania indicated that numbers have increased at a moderate rate of 2.6 % per year from 26 593 691 million to 31 614 837 from 1999 to 2003 (Table 1). The author concluded that this increase in poultry population is generally low compared to the increase in local demand for poultry meat and eggs in the country.

Various strategies to improve the productivity of scavenging systems have been suggested by several authors (Katule, 1990, Safalaoh, 1997, Kyvsgaard *et al.*, 1999, Smith, 2001, Goromela, 2009). These strategies include: improvement of the scavenging diets, the use of more productive birds, better management, disease control and the use of unconventional feeds.

**Table 1: Chicken population trend in Mainland Tanzania**

<b>Year</b>	<b>Village Chickens</b>	<b>Layers</b>	<b>Broilers</b>	<b>Total</b>
1995	26 593 691	287 691	184 002	27 065 384
1999	26 736 174	724 587	517 147	27 977 907
2003	31 614 837	1 126 697	565 712	33 307246

**Source: Agricultural Sample Census (2003)**

However, research in promotion of livestock production has concentrated on improvements in management while ignoring the potential role of socio-economic issues, such as marketing (Gausi *et al.*, 2004).

Selling of free-range local chickens is one of the activities observed during surveys and monitoring studies (Gausi *et al.*, 2004). The cash from sales is used to buy household needs including food, to improve food security at household level (Kondombo *et al.*, 2003). Some farmers barter their free-range local chickens for food and household items. Missohou *et al.* (2002) reported that in Senegal, farmers exchanged six local chickens for one goat. Mwalusanya *et al.* (2001) and Ekue *et al.* (2002) concluded that, regardless of the mode of sales, this function ranks among the top three most important roles (food, income and socio-cultural) that are played by local chickens for the wellbeing of the household and community.

Branckaert and Guèye (1999) reported that an established market structure for free-range chickens is a prerequisite for developing VCs. Even in breeding programme development, indices require appropriate economic values that could be derived from such market studies. Therefore, analysis of the marketing system for VCs in the area will help to determine the existing market situations at all levels of the chain.

## **1.2 Problem Statement and Justification**

As stated earlier, village chickens are important in most rural Tanzanian areas. Studies done by Mlozi, *et al.* (2003) and Gausi *et al.* (2004) to assess the market chains for the VCs in Morogoro, Tanzania and Malawi, respectively, revealed that middlemen benefit more than farmers in the marketing chain. Whereas Mukiibi *et al.* (2005) in Uganda reported that farmers constantly complain that the difference between what they are paid at farm gate and urban markets is very big at time discouraging investment in improving the sub – sector.

There is no research which has been done in Meru district to assess production performance of VCs and whether the farmers benefit or lose in marketing their chickens. Given the importance of chickens in household income of smallholder farmers, there is a need to assess production, constraints and the existing market situations. The information obtained from this study would assist policy makers to improve the market situation of VCs and improve returns to chicken keepers.

### **1.3 Objectives**

#### **1.3.1 General objective**

To assess production performance and market chains of village chickens in Meru district.

#### **1.3.2 Specific objectives**

- i) To assess the production performance of VCs in Meru District,
- ii) To identify market chains, and market opportunities for the VCs in Meru district,
- iii) To analyze the marketing margins and profit margins at different stages in the market chains.

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Village Chickens

The scavenging system dominates the rural poultry sector of most African countries, and the domestic fowl (*Gallus domesticus*) is the most common species. In the present study, the term village chickens (VCs) is adopted from recent studies in rural poultry development, which differentiates the scavenging chickens from the intensive production systems. The term VCs best describes the scavenging chickens because of the effect of the village socio-economic and biophysical environment on the production and health status of the chickens. The human settlement pattern, exchange of live chickens and chicken products affect production performance, breeding pattern and disease epidemiology (Kalita *et al.*, 2004).

Village chickens play an important role in almost every rural household and in the livelihoods of rural farming communities. In addition to the provision of rural families with a high quality animal protein consumed at home in the form of meat and eggs, the chickens are also kept for various purposes such as cash to meet family needs, gifts, manure, traditional medicine, and can be bartered with food or other commodities for household needs (Goromela, 2009).

##### 2.1.1 Production systems of VCs

###### (a) Scavenging/free range production system

The scavenging system is the most dominant poultry production system under traditional management in the rural areas of Tanzania. This system has been characterised by inappropriate bird management practices with little or no inputs for housing. In addition, in this system there is only marginal feeding or health care. The chickens are left to search for

their own food around the homesteads and surrounding crop fields during daytime. At night, they are kept in shelters or in the houses together with the household members for security purposes (Goromela *et al.*, 1999).

### **(b) Small scale production or semi - scavenging system**

The essential feature in this system is that the flock is contained in a shelter overnight and during the day (Sonaiya, 1990). Sometimes chickens are free to eat green forages they find in a run. Some important characteristics of VCs production systems are summarized in Table 2.

**Table 2: Characteristics of VCs production system in Africa**

	<b>Free range</b>	<b>Backyard</b>	<b>Small scale</b>
Type of owner	Peasant	Family (rural & suburban)	Individual Co- operative
Birds used	Local breeds	Local & exotic	Local & exotic
Source & disposal of birds	Gifts, consumption	Gifts, local market, consumption	Local market supply/ Cooperatives/ consumption
Flock size	5 -15	5 – 15	20 -100
Housing/ cages	None	Makeshift	Purpose built
Feed (supplements)	None	Grains, food scraps	Compound feeds
Health		Unconventional feed	Unconventional feed
Management	None	Traditional	Traditional, modern
Mean annual egg production per hen	10 – 40	30 – 60	80 -150
Adult body weight (Kg)	0.8 – 1.0	1.2 - 1.8	1.5 – 2.5

**Source: Horst (1995)**

## **2.2 Poultry Industry in Tanzania**

According to Mwalusanya (1998), poultry production in Tanzania is carried out in two systems, the traditional and commercial systems.

### **2.2.1 Traditional system**

This is by far the larger of the two systems and constitutes 93.3% of the 27 million chicken populations in the country (MOA, 1995). The system is mainly based on scavenging local chickens in rural areas and peri – urban areas. Apart from the great variation manifested in local chickens with respect to anatomical and plumage characteristics, great variation are observed also with respect to body size and egg production capacity (Kabatange and Katule, 1989). Generally production coefficients are low due to low genetic potential, poor management, lack of adequate feeding and medication (Katule, 1990). In addition there is high mortality, especially in chicks and growers. Seasonal fluctuations in quality and quantity of scavenging feed resources (SFR) in terms of energy and protein supply in VCs system are the most important limiting factors for good growth and egg production. A long reproductive cycle due to incubation, brooding and rearing behaviour in the VCs are other factors associated with low egg production under scavenging VCs system. In terms of survival rates, high prevalence diseases and predators are the major cause of high mortalities of VCs in Tanzania (Goromela, 2009).

### **2.2.2 Commercial system**

The commercial poultry production sector is still in its infancy and mostly based on commercially improved hybrid chickens and is concentrated mainly in urban and peri – urban areas. The sector constitutes about 6.7% of the total chicken population (MOA, 1995). The biggest supply of poultry meat and eggs in urban areas comes from this sector. The government policy is to enhance development of the traditional sector at the same time encourage private commercial poultry production to improve family nutrition (MAC, 1996).



### **2.3 Production Indices**

The observations on genetic improvement programmes based on the introduction of exotic genes in local populations through cockerel exchange, supply of pullets or hatching eggs have been reported in Malawi (Safalaoh, 1997).

In Tanzania, a study done by Minga *et al.* (1989) reported that indigenous chickens are generally of low production potential. A laying hen produces 50 to 70 eggs per year. Further more, MAF (2003) reported an annual egg production of 40 to 60 per hen in three separate clutches. The birds take 7 to 8 months to reach slaughter weight yielding only 0.75 kg of carcass weight.

According to Horst (1988), the genetic resource base of the indigenous chickens in the tropics is rich and should form the basis of genetic improvement and diversification to produce a breed adapted to the tropics. Horst (1988) described nine genes of indigenous chickens (Table 3) that can be used in genetic improvement programmes. The information collected in FAO, DAD – IS, shows that these genes are prevalent in the population across the African Countries.

**Table 3: Major genes in local fowl populations, with side effect on tropical tolerance**

<b>Gene</b>	<b>Mode of inheritance</b>	<b>Direct effects</b>	<b>Indirect effect</b>
Dw: dwarf	Recessive, sex-linked, multiple allelic	Reduction of body size 10-30%	Reduced metabolism, improved fitness and disease tolerance
Na: naked neck	Incomplete dominant	Loss of neck feathers, reduction of pterlae width, reduction of secondary feathers	Improved ability for convection, reduced embryonic liveability (hatchability), improved adult fitness
F: Frizzle	Incomplete dominant	Curling of feathers, reduced feathering	Decreased fitness under temperate conditions, improved ability for convection
H: silky	Recessive	Lack of hamuli on the barbules, delicate shafts, long barbs at contour feathers	Improved ability for convection
K: slow feathering	Dominant, sex-linked multiple allelic	Delay of feathering	Reduced protein requirement, reduced fat deposition during juvenile life, increased heat loss during early growth, reduced viability
id: non-inhibitor	Recessive, sex-linked, multiple allelic	Dermal melanin deposition in the skin and shanks	Improved ability for radiation from shanks and skin
Fm: fibro-melanosis	Dominant with multi-factorial modifiers	Melanin deposition: all over the body; sheaths of muscles and nerves, tendon, esenterium; blood vessel walls	Protection of skin against UV radiation, improved radiation from the skin, increased pack-cell volume and plasma protein
P: Pea comb	Dominant	Change of skin structure: compact comb size; reduction of pterlae width; development of breast ridges	Improved ability for convection, increased frequency of breast blisters, sex-limited (0) improvement of late juvenile growth
O: blue shell	Dominant, sex-linked	Deposition of blue pigment (bilverdin IX) into egg shell	Improved egg shell stability

**Source: Horst (1988)**

## **2.4 Poultry Health and Mortality**

Since scavenging poultry are kept with minimal inputs by local keepers, relatively high mortality, from whatever cause tends to be tolerated. Although this is more the case where there are very little input and less so with higher inputs systems. Often, poultry keepers aspire for having higher survivability and good health in their flocks (Acamovic *et al.*, 2004). However, mortality still occurs, mainly due to the following factors.

### **2.4.1 Predators**

Predation is a significant cause of loss in family poultry. Young chicks below eight weeks of age are extremely vulnerable to predators, which can account for more than 80 per cent of the mortality. Horst (1988) reported that 18- 32 percent of all chicks are lost due to predation during the brooding period. A study by Yongolo (1996) in Tanzania indicated a chick mortality of 60% by the age of 10 weeks. Recent studies in Southern India have also shown that 21 per cent of mortalities were attributed to predation (Natarajan *et al.*, 2004). For young birds, predation by birds of prey, crows, snakes, animals such as mongoose and wild cats and, dogs contribute substantially to losses of scavenging poultry.

### **2.4.2 Diseases and parasites**

Mortality in adult chickens is mainly due to diseases. Because of the free ranging and unconfined type of management, disease control is very difficult and, therefore, rarely practised by village farmers (Aini, 1990). Great losses are observed in terms of mortality and reduced production. Results from different studies reveal that the main killer and the most destructive disease, which causes highest economic losses in local chickens is Newcastle diseases (Mtei and Msami, 1996; Permin *et al.*, 1997 and Yongolo, 1996). In these studies mortality of chickens ranging from 50 to 100% have been attributed to Newcastle diseases. Much work has been conducted on the protection of village poultry

from Newcastle disease, supported by agencies such as ACIAR and FAO/IAEA, where vaccination procedures have been developed and adopted (Al- Garib *et al.*, 2003). Other common diseases encountered in local chickens are infectious bronchitis, infectious coryza, fowl cholera, fowl pox, colibacillosis, chronic respiratory disease, coccidiosis (Kelly *et al.*, 1994). Although most of these diseases have been diagnosed and reported, there is little information with regard to their epidemiology and impact to the poultry industry (Yongolo, 1996).

Scavenging birds also suffer from ecto- and endo parasites. Internal parasitism (cestodes and nematodes) is very common in scavenging chickens. In a cross sectional study in Tanzania, Permin *et al.* (1997) revealed a 100% prevalence of helminths in scavenging chickens. All chickens were infested with one or several species of helminths. The presence of a few parasites does not usually cause a problem. However, large numbers can have a devastating effect on growth, egg production, and overall health. The competition for nutrients, damage of the GIT and blockage of the GIT severely limit performance of the birds and increase the susceptibility to other diseases (Acamovic *et al.*, 2004).

Some cases of ill- health also occur because of lack of feed and nutrients, as well as the consumption of toxic feed stuffs or anti- nutritional compounds. Conversely, the consumption of feedstuffs with some anti- nutritional or toxic compounds may have beneficial effect because of their effects on the micro flora and parasites within the GIT (Acamovic *et al.*, 2004). For example the supplementation of layers with high- tannin sorghum instead of low- tannin sorghum resulted in better egg production and viability (Acamovic *et al.*, 2004).

## **2.5 Housing**

During daylight hours poultry are frequently allowed to scavenge whatever food they are able to find in the local environments. In some cases the birds are allowed to roost in the branches of trees or in enclosed baskets hanging from trees, wooden or brick accommodation attached to the dwelling house or even stone or brick- built accommodation which is separate from the family dwelling.

These houses tend to be less prevalent, because of the cost of construction. Brick built poultry houses tend to be difficult to clean and thus present a potential threat due to the build up of pathogens. In the more semi intensive system in Bangladesh, wire netting accommodation is constructed to house a larger number of birds (Acamovic *et al.*, 2005).

## **2.6 Nutrition of Scavenging Chickens**

The production of a flock will depend much on the level of nutrition. The greatest constraints to production in rural chicken production are in adequate nutrition both in quantity and quality (Ologhobo, 1990). The major components of the diet of scavenging birds come from the environment, where they scavenge. The feed items found from the crops of free scavenging chickens were whole grain, boiled rice, maize grit, maize bran, green forages, insects, worms, kitchen waste and unidentified particles (Gunaratne *et al.*, 1993 and Dessie, 1996). As the availability of these feed items varies with climate and season, there is a possibility that the plane of nutrition of scavenging chickens will vary accordingly.

**Water**

Because of the small size of poultry, and their small numbers in the family poultry system, there is a minimal requirement for water. Except in arid and semi arid areas, sufficient water is usually available where humans have settled (Acamovic *et al.*, 2005).

**Minerals and vitamin deficiency**

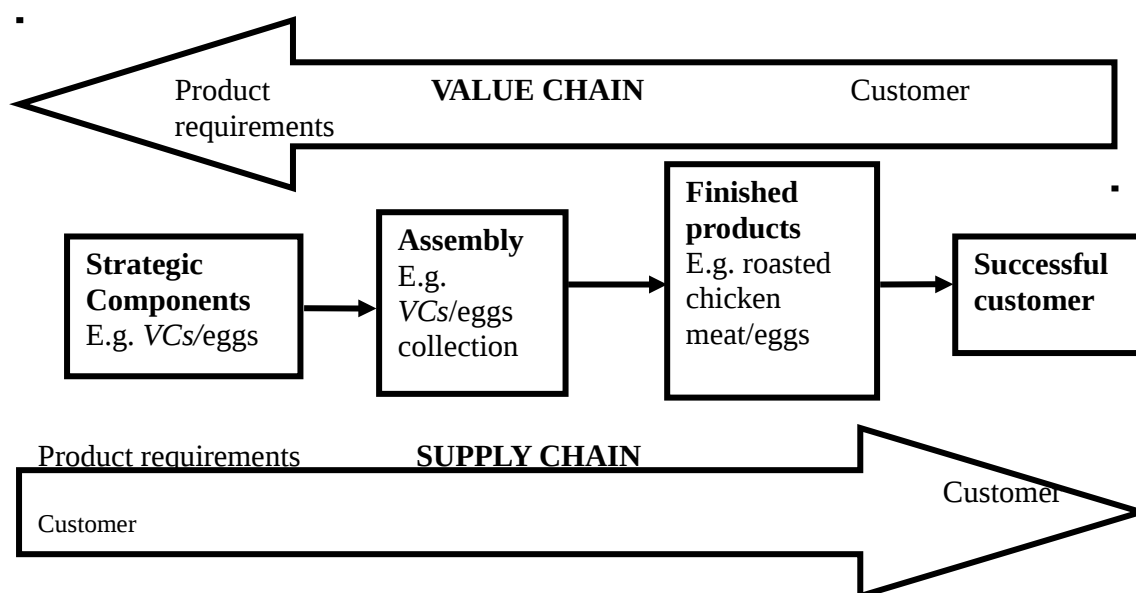
Vitamin deficiencies, especially A and E, may occur in environments where cereals are the main constituents of diets. Deficiency of vitamins is likely to cause ill health in birds and reduce hatchability in eggs. Similarly, deficiencies of minerals, especially calcium, will cause problems with egg- shell quality and thus decrease hatchability and increase fragility of the eggs. In the area with high deposits of heavy metals, or where birds consume by-products from industrial sources and sewage sludge and slurry, it is possible that mineral toxicity may occur (Acamovic *et al.*, 2005).

**2.7 Marketing of Village Chickens and Eggs**

Marketing channels for village chickens include selling of chickens and eggs to households within the villages, on road sides, during entertainment ceremonies and even in local and city markets (Ekue *et al.*, 2002; Missohou *et al.*, 2002). The market channels are described as informal and poorly developed (Mlozi *et al.*, 2003). On the other hand, free-ranging local chickens are claimed to be on demand and fetch high market prices in urban markets of Malawi, Nicaragua and many developing countries in Africa and Asia due to preferred attributes such as being tastier than improved broiler strains (Kyvsgaard *et al.*, 1999; Branckaert and Guèye, 1999).

### 2.7.1 Value chain

Value chain is the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivering to final consumer and final disposal after use (Kaplisky and Morris, 2001). Value chain refers to the integration of key business from end users through original suppliers that provide products, services and information that add value for customers and other stakeholders. Supply chains, however, do not necessarily add value; the two chains flow in opposite directions (Fig.1).



**Figure 1: A comparison of value chain with supply chain**

**Source: Modified from Feller and Callarman (2006)**

### 2.7.2 Supply chain and chain actors of VCs and eggs

Studies done by Mlozi *et al.* (2003) and Gausi *et al.* (2004) to assess the market chains for the scavenging chickens in Morogoro, Tanzania and Malawi, respectively realized the market chain of VCs to comprise of famers, middleman and consumers. A study done by Mukiibi *et al.* (2005) in Uganda to identify the key players in the marketing chain of rural

chickens and work out farm gate prices, retailers selling prices at the rural markets and also in towns reported the marketing chain of local chickens to be simple and undeveloped with fewer infrastructure at all market places. The main marketing channels were: from farmer to farmer or consumer (informal marketing), and from farmer to retailer and then to consumer (primary marketing). Some farmers sell direct to restaurants while others sell to traders who take products to secondary markets and urban markets. Such supply chains have also been reported by Gondwe *et al.* (2005) in Malawi.

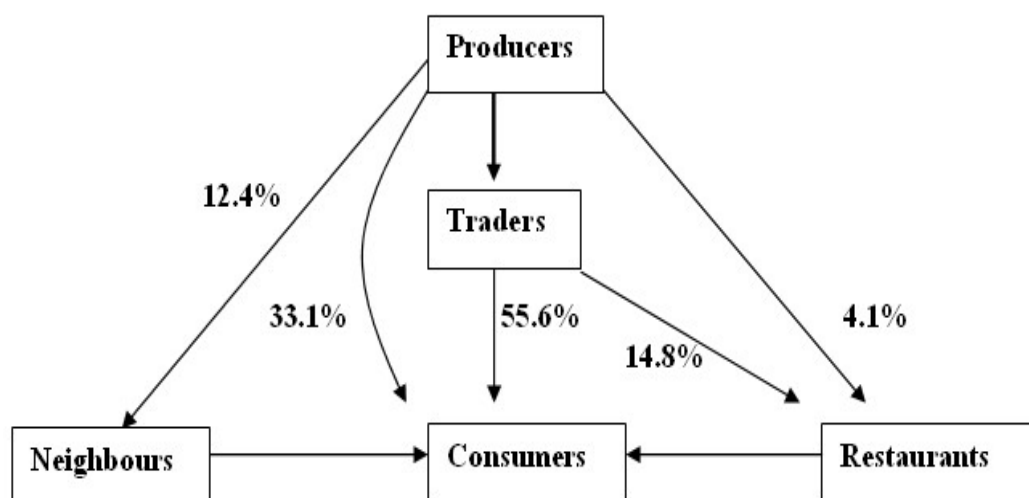
A study done by Akyoo and Lazaro (2008), on the supply chain of spice industry in Tanzania observed that the larger the number of layers of the upstream actors the lower the share of the price received by the farmers.

### **2.7.3 Market chains**

Market chains transactions handled by traders fall into two major categories: Transactions occurring between traders as rural assemblers, and those between traders and consumers as assembler-retailers (Gausi *et al.*, 2004). Rural assemblers are involved in accumulating supplies from producers for re-sell to retailers mostly in urban markets. Assembler-retailers concentrate supplies from producers in the rural assembly markets for final selling to consumers mostly in urban markets Gausi *et al.* (2004) further separated the 2 major categories of market chains into 4 sub - chains as follows (Fig. 2):

- The first chain involved producers and neighbours/ consumers;
- The second chain involved producers to consumers in the urban areas;
- The third chain involved producers, traders to either consumers or to restaurants and finally to consumers; and
- The fourth chain involved producers, restaurants, finally to the consumers





**Figure 2: Market chains of VCs in Malawi**

#### 2.7.4 Analysis of market margins and gross profit margins

##### Marketing margins

This is the percentage of the final weighted average selling price taken by each stage of the marketing chain. It also accounts for the difference between the value of sales and purchases at each node. Marketing margins consist of cost of services and profit margin. Marketing margin measures the share of the final selling price that is captured by a particular agent in marketing chain (Scott, 1995). There are several types of marketing margins, based on the market level being considered. The wholesaler margin is the difference between the price paid by the wholesaler and the farm gate and producer price. The retail margin is the difference between the price the retail trader pays and the price he/she charges to consumers.

##### Gross margins

The gross margin is a measure to show how much of each sale dollar a company keeps after factoring in cost of goods sold. For example, if a company has a gross margin of 75 percent, then for every \$ 1 in sales, the company will keep 75 cents (McBride, 2007). A study by Mlozi *et al.* (2003) on marketing of VCs in Tanzania regarded the farm gate prices

of selling a hen and a cock as gross profit realized by a farmer. An assumption was made that farmers used family labour and chickens were reared under free range system, in which there was minimum cost involved (Mlozi *et al.*, 2003).

The middleman's profit was estimated as follows:

$$MP = SP - FGP - TC - HC$$

Where; MP = Middleman's profit;

FGP = Farm gate price;

SP = Selling price;

TC = Transportation cost;

HC = Handling cost (levy, chickenfeed, watchman).

## CHAPTER THREE

### 3.0 MATERIALS AND METHODS

#### 3.1 Location of the Study Area

This study was conducted in Meru district which was formerly part of the Arumeru District.

Meru District is one of the five districts in the Arusha Region. Other districts of the region are: Arusha rural, Monduli, Karatu, Ngorongoro and Longido. To the West it is bounded by Arusha rural District; to the North by Longido District; to the East by Hai District and to the South by Simanjiro District (Fig. 3).

Meru District covers an area of 1,387.22 km<sup>2</sup> and is located between latitudes 03<sup>0</sup> to 4<sup>0</sup> S, and longitude 36<sup>0</sup> to 37<sup>0</sup> 'E. The District is administratively divided into 17 wards. The chief town of the District is Usa - River which is located 17 km from the Regional headquarter - Arusha, and 647 km, from Dar es Salaam. The average elevation of the district is about 1250 m above sea level.

The selected district was based on the importance of VCs in Meru district, while availability of land for large scale farming is critical. Furthermore, proximity to Arusha town offers a great opportunity for marketing of VCs.

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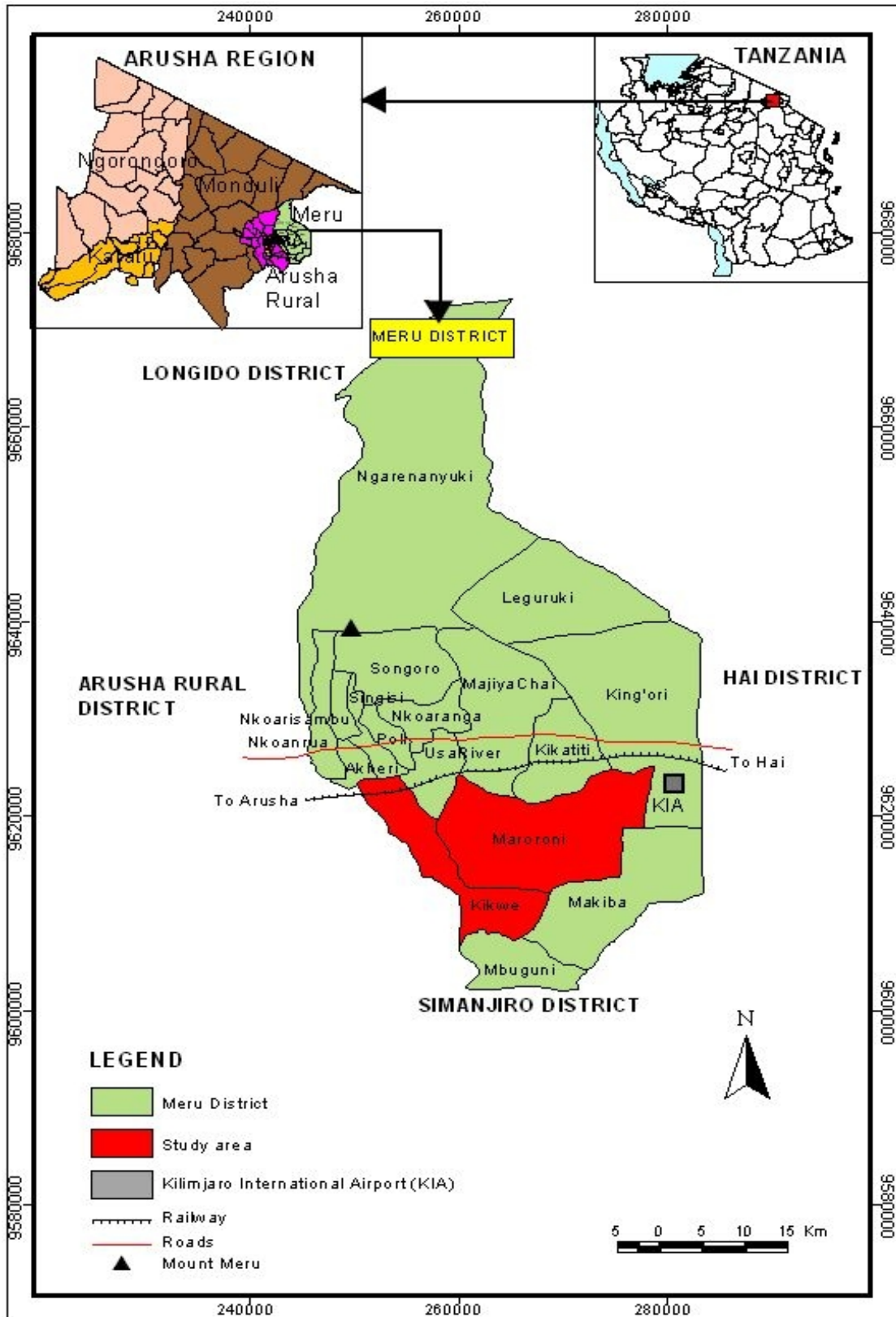


Figure 3: A Map of Meru District with study area highlighted

## **3.2 Sampling Procedure**

### **3.2.1 Sampling of villages and farmers**

Purposive sampling method was used whereby two wards namely Kikwe and Maroroni were selected from the district and three villages were also selected from each ward. Kikwe ward is located 20 km from Arusha town, among which 12 km are on good Arusha - Moshi tarmac road and the rest 8 km are on accessible gravel road during rain season. Whereas, Maroroni ward is located 42 km from Arusha town among which 35 km are on good Arusha - Moshi tarmac road and the rest 7 km are on accessible gravel road during rain season.

The villages selected (Table 5) were: Kikwe, Karangai and Valeska from Kikwe ward, Maroroni, Kwa – Ugoro and Samaria from Maroroni ward. The wards were selected depending on their accessibility and the large number of the VCs kept.

From each village farmers were stratified according to the number of VCs they kept. Three strata were used: low (5-14), medium (15-24) and large (above 24). There after, random sampling was applied whereby 5 respondents were chosen from each stratum. Finally, a total of 15 farmers from each village were obtained to make a total of 45 farmers in each ward sampled. Thus 90 farmers were obtained from the two wards (Table 5).

This sample size was justified by limitation of time and other resources; degree of accuracy; and a need to ensure sufficient number for meaningful analysis (Bailey, 1994). A household was used as the sampling unit because it is the most appropriate unit of measure when assessing the level of poverty and standards of living in a society (Blackwood and Lynch, 1994).

### 3.2.2 Sampling of traders

In total, 78 traders from the whole district were selected by using quota sampling in order to include various trade types to get diverse information. These included 34 primary market/traders also known as local collectors; 17 egg traders who buy the eggs at primary markets; 12 bulky suppliers who buy chickens from primary market to supply them to hotels, restaurants/bars; 6 hotels, restaurants/bars; and 9 secondary markets (in Arusha township) (Table 5). Sampling of traders was done by using quota sampling since marketing studies are particularly fond of this form of sampling design (Bernard, 1994).

### 3.2.3 Sampling of consumers

A total of 33 consumers of VCs were also sampled. The respondents (consumers) were obtained from villages, hotels/restaurants through convenience sampling. Any consumer of VCs meat and eggs who was willing to answer the related research questions were interviewed (Table 4).

**Table 4: The total number of respondents for each market chain**

<b>Respondents</b>	<b>Total</b>
Producer	90
Primary market/local collector	34
Egg traders	17
Bulky supplier	12
Hotels, restaurants/bars	6
Secondary market	9
Consumers	33
<b>Grand total of respondents</b>	<b>201</b>

## 3.3 Data Collection

Data collection was done by the researcher assisted by three trained interviewers who were trained by the researcher before the starting of the research. Data that were collected from the VCs producers included: respondents' characteristics such as age, gender, family and land size, education level, source of income, flock size and structure (number of cocks, hens, and growers). Management of VCs such as treatments and disease control, supplementary feeding and housing to the VCs, performance of VCs such as number of eggs per hen per clutch, number of clutches per hen per year, hatchability percent during dry and wet seasons, survival rates of chicks, growers, and adults, marketing and constraints in rearing and marketing of VCs.

Data from the traders included marketing of VCs, eggs and constraints in marketing. Data from consumers included consumer characteristics such as preference of VCs meat and eggs, price of VCs meat, live birds and eggs and constraints in consuming the VCs meat and eggs.

### **3.3.1 Instrument for data collection**

Structured questionnaires specific for each category of respondents were used as instruments for interviewing of selected respondents (Appendices 1 - 3). The questionnaires covered: production performance of VCs, Farmers' Traders' and consumers' characteristics. Each of the selected respondents was interviewed according to the corresponding questionnaire.

### **3.3.2 Data analysis**

The collected data were coded, entered in a computer and analyzed using the Statistical Package for Social Sciences (SPSS) version 16.0, computer software (2007).

### **Analysis for production performance of village chickens**

Production performance levels of village chickens were computed through descriptive statistics such as mean, frequencies and percentages. Chi-square ( $\chi^2$ ) - test was used to test whether there were statistical relationships between various variables such as education level. Also relationship between egg production and seasons, i.e. dry and wet season was analysed.

### **Analysis for market chain and market opportunities**

Analysis for marketing chain and marketing opportunities were computed through descriptive statistics whereby: Mean, standard deviation, standard error, frequency and percentages were obtained.

### **Analysis for market margins**

The gross margins of VCs were computed so as to know the economic profitability of the chicken's enterprise.

Total marketing margins were estimated with Microsoft Excel Package using equation redeveloped by Amir and Knispheer (1989) as follows:

$$MM = \{(S P - B P) \div F C P\} * 100,$$

Where

MM = Marketing margin (%)

SP\* = selling price at each level

BP\* = Buying price at each level; and

FCP= final consumer price

**Note\*** The levels for selling price are: 1, 2, and 3 (where 1 = village, 2 = primary market, and 3 = town. Also the levels for buying price are: 1, 2 and 3 (where 1 = village, 2 = primary market and 3 towns.

The profit margin for VCs was calculated from the total revenue obtained less total variable costs associated with purchase price of chicken, transport, feed, water, labour and



tax. Whereas the profit margin of eggs was calculated based on total revenue obtained less total variable costs associated with purchase price of an egg, transport and labour.

Profit margin was used to indicate who were more rewarded in the market chain. It was assumed that the higher the profit margin one gets the more rewarded he/she was in the chain. Gross margins were calculated based on the formula:

Profit margin ( $\Pi_{ij}$ ) for actor in the node  $j = TR_{ij} - TC_{ij}$  (Scott, 1995).

Where

$TR_{ij}$  = Mean total revenue obtained by actor  $i$  at node  $j$ , for  $i$  = individual market, chain actor such as producer, local collector, bulky supplier, hotelier, etc.

$TC_{ij}$  = Mean total cost incurred by actor  $i$  at node  $j$ , for  $j$  = selling points for Chickens /eggs such as farm gate, primary market, hotels, restaurants/bars, etc.

$TR_{ij} = (P_y * Q_y) =$  Mean Selling price of chickens/eggs \* Mean quantity sold (at a particular node),

$TC_{ij} = (P_x * Q_x) =$  Mean buying price of chickens/eggs \* Mean quantity purchased at a particular node).

## CHAPTER FOUR

### 4.0 RESULTS AND DISCUSSION

#### 4.1 Location of Villages from Arusha Town

The distances of the selected villages from the two wards are shown in Table 5.

**Table 5: Location of the selected villages from Arusha town**

<b>Ward</b>	<b>Selected villages within the ward</b>	<b>Location from Arusha town (km)</b>	<b>Location from Arusha - Moshi tarmac road (km)</b>	<b>Accessible gravel/corugated road during rain season (km)</b>
<b>Kikwe:</b>	Kikwe	20	12	8
	Karangai	25	17	8
	Valeska	47	35	12
<b>Maroroni:</b>	Maroroni	42	35	7
	Kwa - Ugoro	25	17	8
	Samaria	41.5	35	6.5

#### **4.2 Demographic Characteristics of Respondents**

A total of 201 respondents were interviewed distributed as given in Table 6. The results show that the average number in the household was 5.2 persons. The household size recorded was higher than the national average of 4.8 members (URT, 2002). In the sample, the majority (63.3%) of VCs producers were females. This finding is similar to that reported by URT (2002), indicating that majority of women are involved in agriculture in rural areas of Tanzania. Producers of VCs (81.1%) responded that they have been rearing the chickens for more than three years, whereas, 18.9% responded to have been keeping chickens for less than three years.

The results also revealed that the number of males in primary market was high (97.1%), due to the nature of work involved in the business of buying and selling the VCs. The business men at primary markets responded that the business was very hard for women as it requires a lot of struggling even fighting during buying of chickens, especially in the high sale seasons. During the market day, the men, especially the youths are found riding bicycles with crates of 15 to 30 VCs, from far distances to the market centres and stay there until the business is over which was too difficult to be performed by women.

The results also indicated that 100% and 66.7% of secondary markets and bulky suppliers respectively were men. At the point of bulky supplies, the number of females was slightly higher compared to that in primary markets. The reason was that there were less hassles at this stage and the market was more organized.

Furthermore, the results show that in the category of consumers of VCs interviewed in the hotels, restaurants/bars, 69.7% were men. The reason might be that men have higher mobility than women and are more likely to eat in restaurants and bars.

The analysis of education for respondents (Table 6) reveals that, 81.1% of VCs producers had attended primary education, 10.0% attended secondary education, 5.6% attended post secondary education and 3.3 % have not attended any formal education.

The study further identified that, 94.1% of primary market respondents attended primary education, 4.0 % attended secondary education. Non formal education respondent was found to be 1.9% in primary market. Also in hotels, restaurants/bars 83.3% of respondents attended primary education and 16.7% attended secondary education. For secondary market, all respondents attended primary education.

The study also revealed that for egg traders 88.2% attained primary education while 5.9% attained secondary education and 5.9% had non formal education. The chi – square test statistics showed high significant relationship on education level of VCs producers and traders ( $p < 0.05$ ).

From the findings it shows that the most chain actors of market are found in the group of primary school leavers. This also coincides with URT (2004), which indicated that

education has significant influence on marketing of Agriculture produce. Given the low levels of education, there is a need to improve education level of VCs chain actors. The action will improve the level of understanding and enable them to use the market opportunity in the area effectively. Massawe (2007) suggested that, due to low level of education for both farming households and traders, there is a danger for many people to be food insecure due to inability to use market information.

Nevertheless, the study identified that, 39.4% of VCs consumers have post secondary education, 36.4% had attended secondary education and 24.2%, had attended primary education. Probably, (39.4%) of the VCs consumers were mainly contributed by employee since from the study, 60.6% of the consumers' income was from employment.

**Table 6: Demographic characteristics of respondents**

Variable	Respondents								P- Value
	Producer	Primary Market	Bulky Supplier	Hotel, restaurant/ Bar	Secondary market	Egg Traders	Consumers	Total respondents	
Number in the sample	90	34	12	6	9	17	33	210	
<b>Sex:</b>									
Male (%)	36.7	97.1	66.7	50	100	58.8	69.7	-	
Female (%)	63.3	2.9	33.3	50	0	41.2	30.3	-	
Household family size for VCs farmers (Mean $\pm$ Se)	5.2 $\pm$ 2.0	-	-	-	-	-	-	-	
Age in years (Mean $\pm$ Std. Deviation)	40.8 $\pm$ 12.8	35.9 $\pm$ 7.8	32.8 $\pm$ 7.6	33.8 $\pm$ 3.0	39.9 $\pm$ 8.4	36.0 $\pm$ 13.1	40.7 $\pm$ 12.9	-	
<b>Experience of keeping VCs</b>									
3 years and above (%)	81.1	-	-	-	-	-	-	-	
Less than 3 years (%)	18.9	-	-	-	-	-	-	-	
<b>Education level:</b>									
Non formal (%)	3.3	1.9	-	-	-	5.9	-	-	
Primary (%)	81.1	94.1	50.0	16.7	100.0	88.2	24.2	-	
Secondary (%)	10.0	4.0	50.0	83.3	-	5.9	36.4	-	
Post secondary (%)	5.6	-	-	-	-	-	39.4	-	

#### **4.3 Socio – Economic Characteristics of Respondents (VCs Keepers)**

Agriculture was the main occupation for VCs (70%) producers, while 23.3 % were engaged in agriculture and business, and the remaining 6.7% were engaged in agriculture and formal employment (Table 7). Kaduma (2006) also concluded that agriculture dominates at village level followed by agriculture and business.

All 100% of the primary market participants reported agriculture and business as their main occupations. Bulky suppliers (75%), reported agriculture and business to be their main source of income. For hotels, restaurants/bars 100% of income was from business. The main occupation for secondary market participants was agriculture and business (55.6%), while 44.4% were engaged in business only.

The major purpose of keeping chickens was for generation of income and home consumption (81.1%). Others (15.6%) responded to have kept the chickens for home consumption only, while very few (3.3%) kept the chickens only for income generation. The purpose of keeping the VCs in the area of study confirmed findings of studies done by most of researchers in developing countries including Tanzania. For example Goromela (2009) indicated that traditional poultry production is dominated by indigenous poultry species and plays an important contribution to household food security and income in Tanzania compared to commercial chickens.

According to the observations from this (Table 7), the owners of the chickens were mainly wives (68.9%); very few households were found where the chickens belonged to both wives and husband (1.1%). The majority of wives owned the chickens because the chickens in the area of study are regarded as small, uneconomical animals, over which women had decision powers. Men took decision on large animals like goats, sheep and

cattle including ownership. The women were allowed to sell the chickens for home expenditures, or slaughter them for home consumption, or offer as a gift to relatives and family friends.

**Table 7: Socio - economic characteristic of respondents**

Variable	Respondents				
	Producers	Primary Market	Bulky Supplies	Secondary market	Hotels, restaurant/ bars
<b>Occupation</b>					
Agriculture only (%)	70.0	-	-	-	-
Business only (%)	-	-	25.0	44.4	100.0
Agriculture and business (%)	23.3	100.0	75.0	55.6	-
Agriculture and employment (%)	6.7	-	-	-	-
<b>Purpose of keeping chickens</b>					
Income generation and home consumption (%)	81.1				
Home consumption (%)	15.6				
Income generation (%)	3.3				
<b>Owner of chickens in the household</b>					
Wife (%)	68.9				
Husband (%)	26.7				
Wife and husband (%)	1.1				
Wife and children (%)	3.3				
<b>Ways of acquiring Chickens by producers</b>					
Buying in cash (%)	90.0				
Gift (%)	6.7				
Given by government (%)	3.3				

#### **4.4 Organizations/Agents Providing Extension/Financial Services to Farmers**

There was little support to VCs farmers from supportive agents and organizations as the results in Table 8 show. There was also limited support from financial agencies, and farmers claimed that they were harassed when they failed to pay the loans. Some farmers were even forced to sell their farms to pay for the loaned money from the financing agencies.

**Table 8: Organisations which provided extension and financial support to farmers****(N = 90)**

<b>Variable</b>	<b>Kikwe (%)</b>	<b>Maroroni (%)</b>	<b>Overall mean percent</b>
<b>Supportive agents:</b>			
Extension agents	68.8	56.0	62.4
Organization agents	31.2	44.0	37.6
<b>Organization agents which supported farmers</b>			
VICOBA	40.0	57.1	47.2
BOMIMTO	40.0	0.0	23.3
CRS	0.0	14.3	5.9
SILC	0.0	14.3	11.8
RECODA	10.0	14.3	5.9
STANDARD CHARTERD BANK	10.0	0.0	5.9

#### **4.5 Production Systems Practised and Housing for VCs in the Study Area**

##### **4.5.1 Scavenging system**

The scavenging system was the main (73.4%) production system of VCs practiced in the area of study (Table 9). In this system, chickens were provided with shelter (house) during the night and left to scavenge during the day, meanwhile they were supplemented with maize bran, sorghum or whole maize grains depending on the availability of these supplements (Plate 1). This was also described by Guěye (1998), who stated that the free - range system is commonly practised by the majority of the rural families in developing countries.





**Plate 1: Provision of village VCs with house and supplementary feeding in scavenging system**

#### **4.5.2 Semi scavenging system**

Other production system of VCs practised in the study area was semi scavenging system (24.4%), (Table 9). This was mainly practised at the start of cultivation until flowering time was over. During that time, the VCs were provided with shelter at night up to midday and provided with supplementary feeds. The chickens were then left free during evening hours to look for worms or green materials, under the supervision of a member of the household. When the farming period was over, the chickens were left free for the whole day but supplementary feeds were still provided to the chickens.

#### **4.5.3 Semi intensive system**

For few farmers (2.2%), semi intensive system (Plate 2), was practised for the lifetime of the chickens. In this case, the chickens were left in the chicken house during the day and night, with the provision of more balanced supplementary feeds. Sometimes in the late evening hours, the chickens were left free to look for worms and green vegetations around the homestead.



**Plate 2: Semi intensive system of rearing VCs in the study area**

#### **4.5.4 Shade/housing**

The results show that 98.3% of the VCs producers provide their chickens with shades/houses. This indicated that farmers in the study area were aware of the importance of housing. There was wide variety of housing in the area of study: Brick wall type of housing was most popular, probably because the bricks were locally made. Some chicken houses were made of slatted wooden walls filled with earth material.

The roofing materials for chicken houses were old corrugated iron sheets; the floor types were: earth floor (55%), concrete floor (18.8%), slatted floor (17.5%), and earth with slatted floor (8.8%), as indicated in Table 9. However, these findings were different from those obtained by Goromela *et al.* (1999) who indicated that, under traditional management system in rural areas of Tanzania, at night, the chickens are kept in shelters or in the houses

together with the household members for security reasons, in present study the chickens were provided with a separate house.

**Table 9: Management system practiced, types of floor used in VCs houses**

Variable	Percent response		
	Kikwe n = 45	Maroroni n = 45	Overall
<b>Chicken Production systems practiced by the VCs farmers:</b>			
<b>Systems</b>			
Scavenging system	76.7	70.0	73.4
Semi scavenging system	21.1	27.8	24.4
Semi intensive system	2.2	2.2	2.2
<b>Housing</b>			
Provision of shelter to the VCs	97.8	96.7	97.3
No provision of shelter the to VCs	2.2	3.3	2.7
<b>Floor type used in chicken houses:</b>			
Earth floor	55.0	55.0	55.0
Concrete floor	15.0	22.5	18.8
Slatted floor	15.0	20.0	17.5
Earth with slatted floor	15.0	2.5	8.8

#### 4.5.5 Differences among the three production systems

There were differences among the three poultry production systems practised in the study area. The differences are outlined in Table 10.

**Table 10: Different among the three production systems practiced in the study area**

Types of system used in the study area	Number of birds Kept	Provision of Supplementary Feeding to birds	Provision of shelter	Veterinary practice	When practiced	Advantages	Disadvantages
<b>Scavenging system</b>	1- 20	Very little amount of food was given to birds (usually one ingredient)	Cheap houses, chickens were left to scavenge during the day time and were provided with shelter during night	Vaccinated with New castle vaccine, mostly treated with herbal medicine, Veterinary drugs were rarely used for treatment of birds	Throughout the year	Low investment costs; Bird can obtain worms and green plants from the scavenged environment to balance for minerals, vitamins and protein requirements	Birds are prone to diseases, predators and theft during scavenging  Low returns
<b>Semi scavenging system</b>	21- 30	Mixed ingredients, the amount of feed given to the birds was higher than that of scavenging system. Chicks were mostly fed with chick starter	Durable house, during the night up to midday and left free during evening hours	Vaccinated with New castle vaccine, Veterinary drugs mainly used for treatment, herbal medicines rarely used for treatments of birds	Mainly during cultivation period	Birds are more protected from disease outbreak, predators and thieves. More income generation than in scavenging system	More costs in constructions feeds and veterinary drugs (Expensive)
<b>Semi intensive system</b>	Above 30	Commercial feed mixed with locally available feed ingredients. Chickens could be left free during evening hours to look for green materials and worms	Provided with durable house, night and day sometime birds were left free during late evening hours	Vaccinated with New castle vaccine, Veterinary drugs mainly used for treatment, herbs rarely given to birds but for better immune system of the birds	Practised for the life time of the birds.	Birds are more protected from disease outbreak, predators and thieves. More income generation than in semi -scavenging system ( more birds/eggs are sold per year)	Risk of disease contaminations such as coccidiosis  Lack of market during low price seasons

**Note: Semi scavenging production system in the study area was practised only by few VCs producers (expensive)**

#### 4.6 Provision of Supplementary Feeds to VCs

The results in Table 11 indicate that all VCs keepers (100%) responded to have provided supplementary feeds to their chickens. The overall mean percent indicated that farmers used more than two ingredients (51.7%), others used only maize bran (21.3%), and some used whole maize with maize bran (19.3%). However, within the 51.7% of farmers who used more than two ingredients as supplementary feed to the VCs, 68.9% were from Maroroni ward while 34.1% were from Kikwe ward. These differences were due to the fact that Maroroni ward is more of rural area (42 km from Arusha town) where the area for crop farming is plenty. Whereas, Kikwe ward is closer to urban area (20 km from Arusha town) where the land for crop farming is scarce. The act of providing supplementary feeds to VCs in the study area contradicts that observed by Goromela *et al.* (1999) who did the research in rural areas of Manyoni District in central Tanzania, and found that chickens are left to search for their own food around the homesteads and surrounding crop – fields during daytime. The majority of VCs farmers (95.6%) reported an increase in body weight and egg production of their chickens after provision of supplementary feeds. The nutritive values of the feeds could not be analyzed in the present study but the results in the Table 11 show that birds were getting more energy than protein.

Supplementation of the VCs with protein and energy feedstuffs has been reported to increase egg production, egg size, feed efficiency and reduced mortality rate (Tadelle and Ogle, 1996). Mapie and Sibanda (2002) in Zimbabwe also observed that 96.6% of VCs farmers provided partial supplementation; 6.2% of the household practised zero supplementation, and 0.2% always provided supplementary feed to their chickens. They also observed that chickens that were fully supplemented had highest flock sizes. In general, well fed chickens have high growth rates and are very fertile and less prone to diseases and parasites (Dessie and Ogle, 1996).

**Table 11: Provision of supplementary feed to VCs (N = 90)**

<b>Variable</b>	<b>Kikwe (percent)</b>	<b>Maroroni (percent)</b>	<b>Overall Mean (percent)</b>
Provision of supplementary feeds to the chicken	100	100	100
<b>Types of supplementary feeds provided to the chickens:</b>			
More than two ingredients	34.1	68.9	51.7
Whole maize grains plus maize bran	29.5	8.9	19.1
Maize bran	29.5	13.3	21.3
Maize bran plus fish meal	6.9	0	3.4
Maize bran plus sorghum	0	6.7	3.4
Kitchen left over	0	2.2	1.1
<b>Outcome of supplementary feeding:</b>			
Increase in body growth and egg production (both)	100	100	100
Increase in growth	0.0	0.0	
Increase in egg production	0.0	0.0	
None of the above	0.0	0.0	

#### **4.7 Use of Cocks of Improved Breeds**

Most (63.3%) VCs keepers used of indigenous cocks for breeding purpose (Table 12). Some farmers (36.7%) have tried to use the cocks of improved breeds, 87.5% of whom obtained the cocks by own means. The survival rates of these cocks were however low since most farmers (71.1%) did not improve management of their chickens after acquiring the cocks of improved breeds.

Those farmers who tried to improve the management of their VCs did not manage to replace cocks of improved breeds because the cocks are either not available or too expensive for farmers. Thus, improvements were short-lived. Katule (1990) stated that generally, production coefficients are low due to low genetic potential, poor management, lack of adequate feeding and medication. Goromela (2000) in Tanzania also showed that

introduction of exotic cocks to improve scavenging chickens failed because the management skills that were needed for these crossbreds were not adopted by the rural people.

However, despite the failures (63.3%) of the farmers in the study areas were still planning to use cocks of improved breeds in order to improve the production of their VCs in terms of body size and eggs (Table 12).

**Table 12: Use of improved breed cocks by farmers (N = 90)**

<b>Variables</b>	<b>Kikwe (percent) n = 45</b>	<b>Maroroni (percent) n = 45</b>	<b>Overall Mean (percent)</b>
<b>Use of improved cocks:</b>			
NO	62.2	64.4	63.3
YES	37.8	35.6	36.7
<b>Source of improved cock:</b>			
Personal	94.1	80	87.5
Government	0	13.3	6.2
Other sources	5.9	6.7	6.2
<b>Breed of improved cock used</b>			
Exotic breed	35.3	62.5	48.5
Cross breed	64.7	37.5	51.5
<b>General management after using improved cocks:</b>			
No management change after using improved cocks	71.1	71.1	71.1
Management change after using improved cocks	28.9	28.9	28.9
<b>Any plan to use improved cocks:</b>			
Farmers are not planning to use improved cocks	28.9	44.4	36.7
Farmers are planning to use improved cocks	71.1	55.6	63.3
<b>Reason for planning to use improved cocks:</b>			
To improve number of eggs and body size of VCs	94.1	100	97.1
To improve eggs only	0.0	0.0	0.0
To improve body size	5.9	0	2.9

Table 13 indicates that 30.8% of interviewed farmers did not use the improved breed cocks because they were not available, some (23.1 %) said that they preferred maintaining cocks of indigenous breeds since they obtained better market prices. Others (23.1%) did not use improved cocks because they were not aware of their existence. Non availability of improved cocks made 45.7% of the farmers not to plan to use them.

**Table 13: Reasons for farmers not using improved cocks (n = 52)**

Variable	Count of responses	Percent count of responses
<b>Why chicken farmers did not use improved breed cocks:</b>		
Improved cocks are not available	16.0	30.8
Maintaining indigenous breeds to fetch more market price	12.0	23.0
Not aware of improved cock breed	12.0	23.0
Improved cocks are too expensive for farmers	8.0	15.4
Improved cocks are not resistant to diseases	3.0	5.8
Maintaining indigenous hens for hatching the exotic layers eggs	1.0	1.9

#### **4.8 Production Performance of VCs in the Study Area**

Egg production data are the main determinant of the flock productivity. Hatchability percent and chicks survival rate are other important parameters in the production characteristics of VCs flock.

##### **4.8.1 Egg production versus seasons**

In this study, the average age at first lay was  $5.7 \pm 1.8$  months old and  $3.2 \pm 0.8$  mean clutches per hen per year (Table 14). The number of eggs laid during dry season was  $17.0 \pm 0.5$  which was higher than the  $12.9 \pm 0.4$  eggs per hen per clutch laid during wet season



( $p < 0.05$ ). The difference is probably because during dry season, there are plenty of grains obtained from farm crops harvested, whereas, the wet season supplementation was erratic because is the time of cultivation with the shortage of energy feeds for the chickens. The reason for high production during dry season might also be due to increased availability of grains, grain by products and sunflower seed cake. Another reason was that, during dry season farmers are able to buy compounded layer's feed from crop earnings and mixed it with locally available feed ingredients for their chickens.

However, there was a small difference in the number of eggs laid per hen per clutch in the two sites in different seasons. In Kikwe ward the number of eggs laid per hen per clutch were  $17.9 \pm 0.7$ ,  $12.0 \pm 0.4$  during dry and wet season respectively, while in Maroroni ward the eggs laid were  $16.0 \pm 0.7$  during dry season and  $13.8 \pm 0.6$  during wet season.

Mwalusanya *et al.* (2001) reported a mean of 12 eggs per clutch, but without considering season. The clutch number from the present study is somehow similar to the data of the VCs in Ethiopia with 3 – 4 clutches per year (Tadelle and Ogle, 2001).

#### **4.8.2 Hatchability percent**

The average number eggs set for hatching per hen were  $12.6 \pm 3.3$ , with percent hatchability of 82.8% and 80.2% during wet season and dry season respectively (Table 14). The percent hatchability during wet season was similar to that of dry season. Mwalusanya *et al.* (2001) reported hatchability of 84%, which was close to the findings of this study.

Chicks were usually hatched by means of natural incubation with broody hens sitting on clutches of eggs (Plate 3). In most cases the hatched chicks were fed, protected from

predators, and raised by their mothers until they were naturally weaned. The natural hatching characteristics of VCs can be used in improving flock productivity. In Bangladesh semi – scavenging model, local chickens (Dessi) were used to hatch eggs from improved stock as a means of introducing new genetic material (Jensen, 1996).



**Plate 3: Natural incubation with broody hen sitting on clutches of eggs**

#### **4.8.3 Chicks survival rates versus seasons**

The study results in Table 14 indicate the survival rate for chicks at 8 – 10 weeks of age was  $70.9 \pm 2.4$  during dry season and 67.5% during wet season and the difference was not significant ( $p > 0.05$ ). A survival rate of 60% at 10 weeks was reported by Mwalusanya which is lower than findings in the present study.

Chick mortality accounts for high losses in most of VCs production systems. Therefore, management factors that would have positive impact on chick survival and egg production can be used to increase output from VCs flocks, e.g. discouraging brooding, preferential treatment of chicks which reduces the rearing period, can also increase the proportion of hens in lay, and consequently egg production and bird output (Kitalyi, 1998).

#### 4.8.4 Adults survival rates versus seasons

The survival rates for adult chicken were equal (87.4% and 86.1%) for wet and dry seasons respectively ( $p > 0.05$ ) (Table 14).

**Table 14: Production performance of VCs in the study area (N = 90)**

Variable	Kikwe (Mean $\pm$ Se) n = 45	Maroroni (Mean $\pm$ Se) n = 45	P- Value
Age at laying (months)	5.8 $\pm$ 0.2	5.6 $\pm$ 0.3	0.532
Number of clutches per hen per year	3.2 $\pm$ 0.1	3.1 $\pm$ 0.1	0.606
Eggs set for hatching per hen	12.2 $\pm$ 0.5	12.9 $\pm$ 0.9	0.308
	Dry season n = 45	Wet season n = 45	P – Value
Number of eggs laid per hen per clutch (Mean $\pm$ Se)	17.0 $\pm$ 0.5	12.9 $\pm$ 0.4	0.000***
Percent hatchability (%)	80.2	82.8	0.288
Survival rate of chicks at 8 – 10 weeks (%)	70.9	67.5	0.306
Survival rate of adult chickens (%)	86.1	87.4	0.704

\*\*\* Highly significant association ( $\alpha = 0.001$ )

#### 4.9 Causes of Mortalities and Major Diseases Affecting the VCs

The results show that, the major chick mortalities occurred at the age of 8 – 10 weeks and were due to diseases (51.3%) and predators mostly sparrow hawk (*mwewe*) (42.9%) (Table 15). The killer disease was coccidiosis (36.8%), followed by fowl pox (30.1%).

The deaths of chicks due to predation were lower than those reported by Mwalusanya *et al.* (2001) (40 to 50%) but higher than those of recent studies in Southern India, which indicated that 21 per cent of mortalities were attributed to predation, and this amounted to 73 per cent of all deaths (Natarajan *et al.*, 2004). Chicken losses during growing and adulthood were mainly due to diseases and predators such as wild cats, snakes, and mongoose (*vicheche*), whereas the killer diseases for growers were coccidiosis (31.3%), Newcastle (29.5%), and fowl pox (23.2%). In adult chickens, the killer diseases were

Newcastle (52.2%), coryza (20.9%) and typhoid (19.4%). These are also indicated in Table 15. However, the mortality in adult chickens due to Newcastle disease was lower compared to that which was indicated by Mtei and Msami (1996) in Tanzania, who revealed a 70% mortality rate due to Newcastle disease. This probably shows that the efforts for controlling the Newcastle disease in VCs in Tanzania have proven positive results.

**Table 15: Causes of mortalities and major diseases affecting the VCs (N = 90)**

<b>Variable</b>	<b>Percent Count) of responses</b>	<b>Count of responses</b>	<b>Total Count of responses</b>
<b>Chick mortality due to:</b>			154.0
Disease	51.3	79.0	
Predators	42.9	66.0	
Other factors	5.2	8	
Accident	0.7	1	
<b>Grower mortality due to:</b>			98.0
Diseases	65.3	64.0	
Predators	27.6	27.0	
Other factors	7.1	7.0	
<b>Adult mortality due to:</b>			74.0
Diseases	70.3	52.0	
Predators	20.3	15.0	
Accident	5.4	4.0	
Other factors	4.1	3.0	
<b>The killer diseases in chicks</b>			133.0
Coccidiosis	36.8	49.0	
Fowl pox	30.1	40.0	
Newcastle	18.8	25	
Infectious Coryza	8.3	11	
Other factors	6.0	8	
<b>The killer diseases in growers</b>			112.0
Coccidiosis	31.3	35.0	
Newcastle	29.5	33.0	
Fowl pox	23.2	26.0	
Infectious coryza	14.3	16.0	
Other factors	1.8	2.0	
<b>The killer diseases in adults</b>			67.0
New castle	52.2	35.0	
Infectious Coryza	20.9	14.0	
Typhoid	19.4	13.0	
Other factors	7.5	5.0	

#### 4.10 Disease Control and Treatment by Using Drugs

Most (85.6%) village chicken farmers vaccinated their chickens against Newcastle disease. The majority of the farmers (97.4%), who vaccinated their flocks did not get outbreak of Newcastle disease, only 2.6% reported disease occurrence after vaccination. Some farmers (14.4%) did not vaccinate their chickens against Newcastle disease as they claimed that they trusted the herbal medicines they administered to their chickens for control of the disease. Also 24.4% of the farmers did not treat their chickens by using drugs instead they used the locally available herbal medicines (Table 16).

The majority of the respondents (75.6%) reported that VCs were treated against several diseases by using veterinary drugs (Table 16). The treatment was reported to be successful by 94.1% (Table 16). The farmers were buying the drugs which had been suggested by the technicians who were working in livestock clinics or pharmacies in the study area.

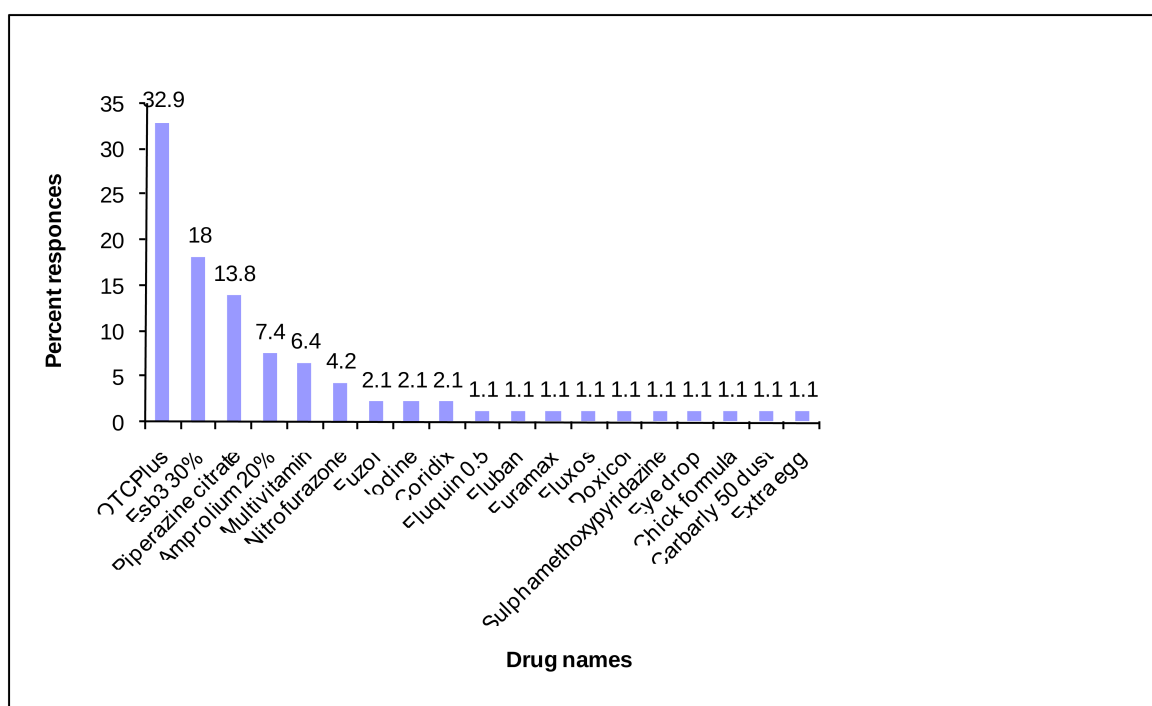
**Table 16: Diseases control and treatment of the chickens by using drugs**

<b>Variable</b>	<b>Frequency</b>	<b>Percent</b>
<b>Vaccination of the flock against diseases (N = 90)</b>		
Vaccination of chickens against Newcastle disease	77	85.6
Chickens not vaccinated against Newcastle disease	13	14.4
<b>Results of vaccination (n = 77)</b>		
No disease outbreak due to Newcastle	75	97.4
There was diseases outbreak due to Newcastle	2	2.6
<b>Treatment of the chicken (n = 90)</b>		
Chickens were treated against the diseases	68	75.6
Chickens were not treated against the diseases	22	24.4
<b>Results of the treatment (n = 68)</b>		
Chickens recovered from the diseases	64	94.1
Chicken did not recover from the diseases	4	5.9

#### 4.10.1 Drug used for the treatment of VCs in the study area

During the study it was observed that VCs farmers were using multiple drugs for the treatment of various chicken diseases (Fig. 4). The most used drugs were; OTC plus (32.9%), Esb<sub>3</sub> 30% (18.0%) and piperazine citrate (13.8%). The usage of many drugs for VCs is an indicator of potential hazards to the consumers of VCs meat and eggs since the farmers are not aware of the withdrawal periods for those drugs before selling the chickens for human consumption. Some may not even use the proper drug doses for treatment.

This may lead to resistance to drugs in chickens and consumers, as well as health problems. Another problem will be marketing of VCs and eggs because some consumers referred to VCs and eggs as organic products, as they believed the chickens received less or no commercial medications.



**Figure 4: Various drugs used for the treatment of VCs in the study area (n = 68).**

#### 4.11 Disease Control and Treatment by Using Herbs

Village chicken producers responded to have been using herbs for disease control and treatment as indicated in Table 17. In this study, 64.4% of farmers were using different herbs for either strengthening the immune system of the chickens or as treatment. For example, *Aloe spp* was used by 26.0% of the farmers for both disease control and treatment. Another herb that was mostly used was *Azadirachta indica (Neem)* (23.7%). In most cases farmers were combining more than one herb, crushed them together and mixing them with chicken feeds or drinking water (Plate 4). Nevertheless, 35.6% of the farmers did not use herbs for treatment of their chickens. The reasons for not using the herbs for treatment of their birds are stated in Table 17.

The use of traditional medicine/herbs in Zimbabwe was also indicated by Mapiye and Sibanda (2002), who observed that 14.4% of the farmers gave traditional medicine to their VCs due to its low cost, local availability and easiness of application. The authors also observed that large flock sizes were obtained from farmers that gave traditional medicine to their chickens. This indicates that traditional medicines do work and have the potential to improve the health status of village flocks.



**Plate 4: Provision of VCs with mixed herbs for treatment and control of diseases**

**Table 17: Disease control and treatment by using herbs (n = 58)**

<b>Herb</b>	<b>Count of responses</b>	<b>Percent count of responses</b>
<i>Aloe spp.</i>	44	26.0
<i>Azadirachta indica</i> (Neem)	40	23.7
<i>Euphorbia tirucadia</i> (Mnyaa)	31	18.3
<i>Capsicum frutescens</i> (Hot pepper)	24	14.2
<i>Cassia spp</i> (Mjohoro)	9	5.3
<i>Agave sisalina</i> (Sisal)	6	3.5
<i>Jatropha curcas</i> (Mchungu kaburi)	3	1.8
<i>Thervetia peruviana</i> (Hedge flowers)	2	1.2
<i>Rauwolfia caffra</i> (Msesewe)	2	1.2
<i>Carica papaya</i> (Pawpaw)	1	0.6
<i>Croton megalocarpus</i> (Mfurufuru)	1	0.6
<i>Cordia africana</i> (Mringringa)	1	0.6
<i>Warbugia salutavis</i> (olsokokonoi)	1	0.6
<i>Psidium guajava</i> (Guava)	1	0.6
<i>Solanum incunum</i> (Ndulele)	1	0.6
Ashes	1	0.6
Charcoal	1	0.6
<b>Total</b>	<b>169</b>	<b>100</b>
<b>Reasons for not using herbs</b>	<b>Frequency</b>	<b>Percent</b>
No reasons for not using herbs	12	37.5
No knowledge on using herbs	9	28.1
No need of using herbs	6	18.8
Herbs have no good response to treatment of VCs		
Farmers did not trust herbs for treatment of their chicken	3	9.4
	2	6.2
<b>Total</b>	<b>32</b>	<b>100</b>



#### **4.12 Marketing of the Chicken**

Most farmers (80.4%), sold most of their chickens to local collectors at farm gate price. The local collectors then send the chickens to primary market (Plate 5 and Table 18a). Seller of the chicken at household were mostly the wives (70.6%) and sometimes by husband (25.9%) (Table 18b).

##### **4.12.1 Purposes for selling chickens and the selling prices at primary market**

Village chickens can be sold for consumption or rearing. The chickens were sold for consumption at the age of 7.8 months and above or sold for rearing at the age of 3.8 months and above (Table 18c). The producers of VCs said they did not prefer to buy old chickens for rearing because the chicken might have been sold due to having production problems.

The result from the study indicated that the mean prices for buying a cock and a hen for rearing at primary market were Tanzania shillings 6814.63 and 4925.40 respectively (Table 18d). Whereas the price for a cock was Tsh 6068.18 and that of a hen was Tsh 4845.59 (Table 18e), when sold for trading or consumption at primary market. Note that when a cock or a hen was sold for rearing it fetched a higher price than when it was sold for trading or consumption because the seller believed that the buyer would benefit more from rearing the chicken than the trader or consumer.



**Plate 5:**

**Marketing of village chickens at primary market**

**4.12.2 Satisfaction with income obtained from VCs by the farmers**

About half of the farmers (52.6%) said that they were not satisfied with the income obtained from VCs production due to lack of enough capital. This forced the farmers to keep few chickens, which translated into higher production costs per bird and, therefore, less income which was not enough for recovering the costs (Table18f).

This finding concur with those of Gausi *et al.* (2004), who stated that most of farmers sell chickens in market places within their vicinity. Economies of scale favour the participation of collectors rather than the farmers taking the birds themselves to primary markets. However, the percentage (29.6%) of rural assemblers in rural - Malawi was smaller (Gausi, *et al.*, 2004). Marketing of the chicken in two locations (n = 90) (Tables 18 - a, - b, -c, d, e, and f).

Variable	Kikwe	Maroroni
	Count of responses	Percent count of responses
<b>Marketing for VCs</b>		
Sold to local collectors at farm gate	74	80.4
Sold direct to primary market	11	11.9
Sold to neighbours	8	8.7
<b>Total count of responses</b>	<b>92</b>	<b>100</b>

**Table 18 b: Seller of the chickens at household level**

Variable	Percent	Percent	Overall Mean Percent
Wife	66.7	74.4	70.6
Husband	26.6	25.6	25.9
Children	2.4	0.0	1.2
Husband and wife	4.8	0.0	2.4

**Table 18c: Age (months) at which chickens are sold for meat or for rearing purposes**

Variable	Kikwe	Maroroni	Overall Mean
	(Mean ± Se) n = 45	(Mean ± Se) n =45	(Mean ± Se)
Sold for meat purpose	7.7 ± 0.17	7.9 ± 0.55	7.8 ± 0.28
Sold for rearing purpose	3.1 ± 0.21	4.4 ± 0.32	3.8 ± 0.21

**Table 18d: Rearing chicken price (Tsh) at primary market**

Variable	Kikwe	Maroroni	Overall Mean
	(Mean ± Std) n = 45	(Mean ± Std) n = 45	(Mean ± Std)
Cock	7076.74 ± 112.52	6525.64 ± 396.51	6814.63 ± 366.24
Hen	4950.70 ± 112.52	4900.70 ± 378.22	4925.40 ± 365.45
Grower	2401.16 ± 2753.32	2000 ± 324.44	2210.37 ± 2005.19

**Table 8e: Prices for buying chicken at Primary market for consumption**

Variable	Mean
Cock	6068.00
Hen	4845.59
Grower	2826.43

**Table 18f: Reasons for insufficient income from the VCs**

Variable	Count of responses	Percent count of responses	Overall Mean Percent
<b>Reasons for inefficient income</b>			
Rearing few VCs due to lack of enough capital	20	52.6	36.3
Few chickens kept, high production costs	11	28.9	20.0
Low off season price	3	7.9	5.5
Low income due to disease outbreak	2	5.3	3.7
Insufficient income	2	5.3	3.7
<b>Total count of responses</b>	<b>38</b>		

#### 4.13 Various Costs (Tsh) Incurred per Annum in Rearing VCs

The results revealed that farmers incurred various costs in rearing VCs. These included: Depreciation<sup>1</sup> costs for VCs house TSH 9 155.85, feed and water costs TSH 126 007.2 costs of veterinary drugs TSH 20 337.8, and transport costs TSH 16 315.8. The feed costs were high probably because the district experienced food shortage throughout the year because of cereal shortage during 2009/10 cropping seasons.

#### **4.14 Constraints in Selling Chickens and Ways of Mitigation Practised**

##### **Selling constraints encountered by VCs producers**

Village chicken producers in the study area responded to have been troubled by several constraints such as:

Low prices for their chickens (69.6%), spending more time for price negotiation during off - season (13.0%), and poor market information (5.8%), as indicated in Table 19. The problem of low farm gate prices for VCs was also identified by Gausi *et al.* (2004) as the major constraints in rural chicken marketing in Malawi.

It should be noted that low off season chicken prices have serious negative impact on VCs producers, especially on poverty reduction aspects to the farmers, as most of them dispose of their chickens to meet pressing needs. At this time most of the crops are not harvested, which gives them low ability for bargaining. In the meantime, the prices for chicken feeds are so high and thus unaffordable by the farmers. This may reduce performance of the chickens.

Most VCs farmers (53.7%), failed to solve the constraint of low off season price, but few of them (20.7%) tried to solve that problem by: stopping selling their chickens until the

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<sup>1</sup> Expected total life time/number of years = 15; Overall Mean Total cost for construction of poultry house – Tshs. 91 558.50; scrap value/second hand value = 0; Depreciation per year = 10%; and Depreciation is computed by straight line method.

period of high sale so that they could fetch higher prices by selling many chickens direct to the wholesalers. Other alternative solutions practised by the farmers are also indicated in Table 19.

**Table 19: Problems in selling chickens and ways of solving them (n = 61)**

Variable	Percent count of responses	Count of responses
<b>Selling problems:</b>		
Low off season price	69.6	48.0
More time for price negotiation	13.0	9.0
Poor market information	5.8	4.0
Poor transport	4.3	3.0
Disease contaminations for unsold chickens	4.3	2.0
Theft	2.9	3.0
<b>Total</b>	<b>100</b>	<b>69.0</b>
<b>Solution to low off season prices</b>		
No solution	56.1	46.0
Stop sell the VCs; find other alternatives	23.2	19.0
Sale to whole sellers to fetch high price	8.5	7.0
To look for another buyer	8.5	7.0
To stop hatching the chicks	3.7	3.0
<b>Total</b>	<b>100</b>	<b>82.0</b>

#### 4.15 The Market Chain, and Market Opportunities for VCs and Eggs

##### 4.15.1 Marketing infrastructure

Bicycles were observed to be the major means of transport within the villages and ward. Pick ups and mini buses were observed to be the major means of transport between the villages and market centres, while minibuses connected to the townships. Bicycles were observed to be used by local collectors for transportation of VCs within the village and to marketing centres (Plate 6).

Fare for the passengers for the mini buses was TSH 700 to 2 000 from the village to market centres and, TSH 500 to 2 000 for transporting one crate of 15 to 35 chickens from the village to the market centres. The cost of mini buses was observed to range from TSH

1 000 to 2 000 from Kikatiti to Arusha and from Kikatiti to Moshi. Kikatiti is a major buying and selling centre of VCs in Meru District.

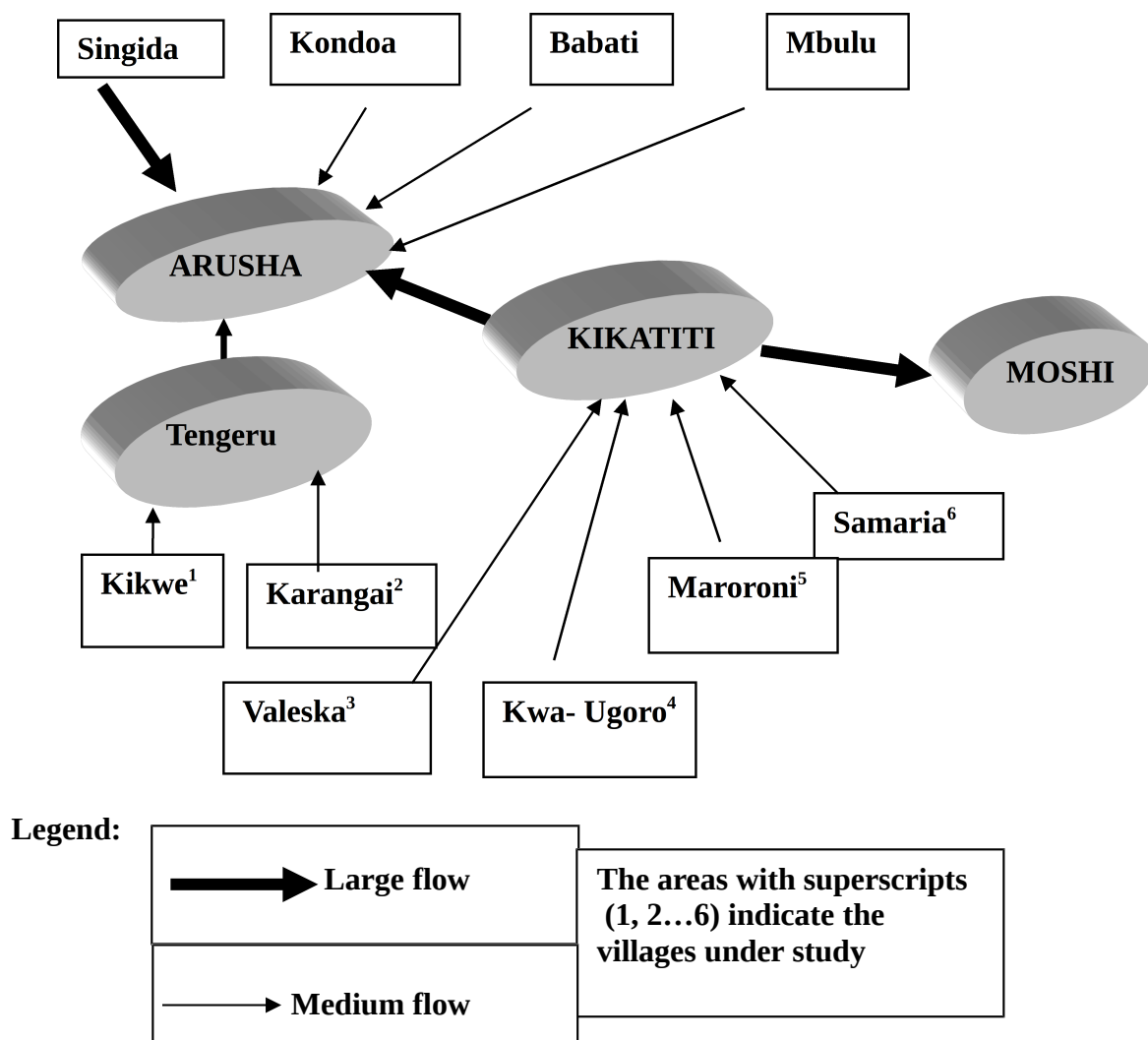


**Plate 6: A Local collector of VCs at a primary market centre (Kikatiti)**

#### 4.15.2 Market map for VCs in the study area

Supplies of VCs from the villages of selected wards in the present study are indicated in Fig. 5. During the study it was observed that the four villages of the study; i.e. Kwa – Ugoro, Valesca, Maroroni and Samaria; supplied their chickens to Kikatiti (a primary market) which was the major collection centre for VCs, whereas Tengeru (primary market), was the medium collection centre for chickens from Kikwe and Karangai villages. The chickens were then sold to bulky suppliers who supplied the chickens to the chief market centres in Arusha and Moshi townships.

The traders in Arusha town indicated that, in addition to Kikatiti and Tengeru, Singida Region was also a major supplier of VCs to Arusha market. Other areas which supplied the chickens to Arusha Township were; Kondoa, Mbulu and Babati districts (Fig. 5).

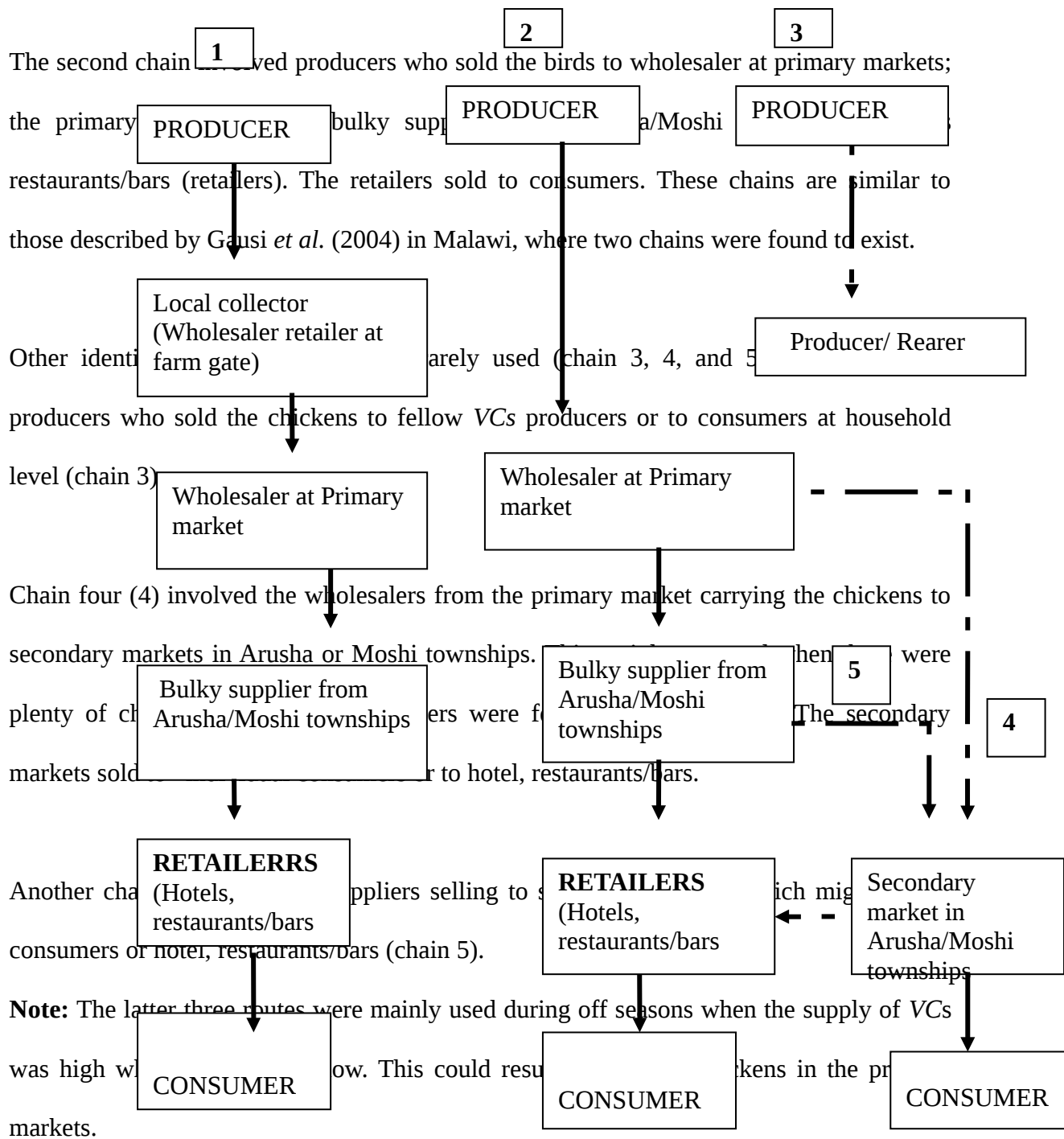


**Figure 5: A map sketch of market for VCs and eggs in the study area**

#### 4.15.3 Marketing chains

##### Marketing chains of VCs in the study area

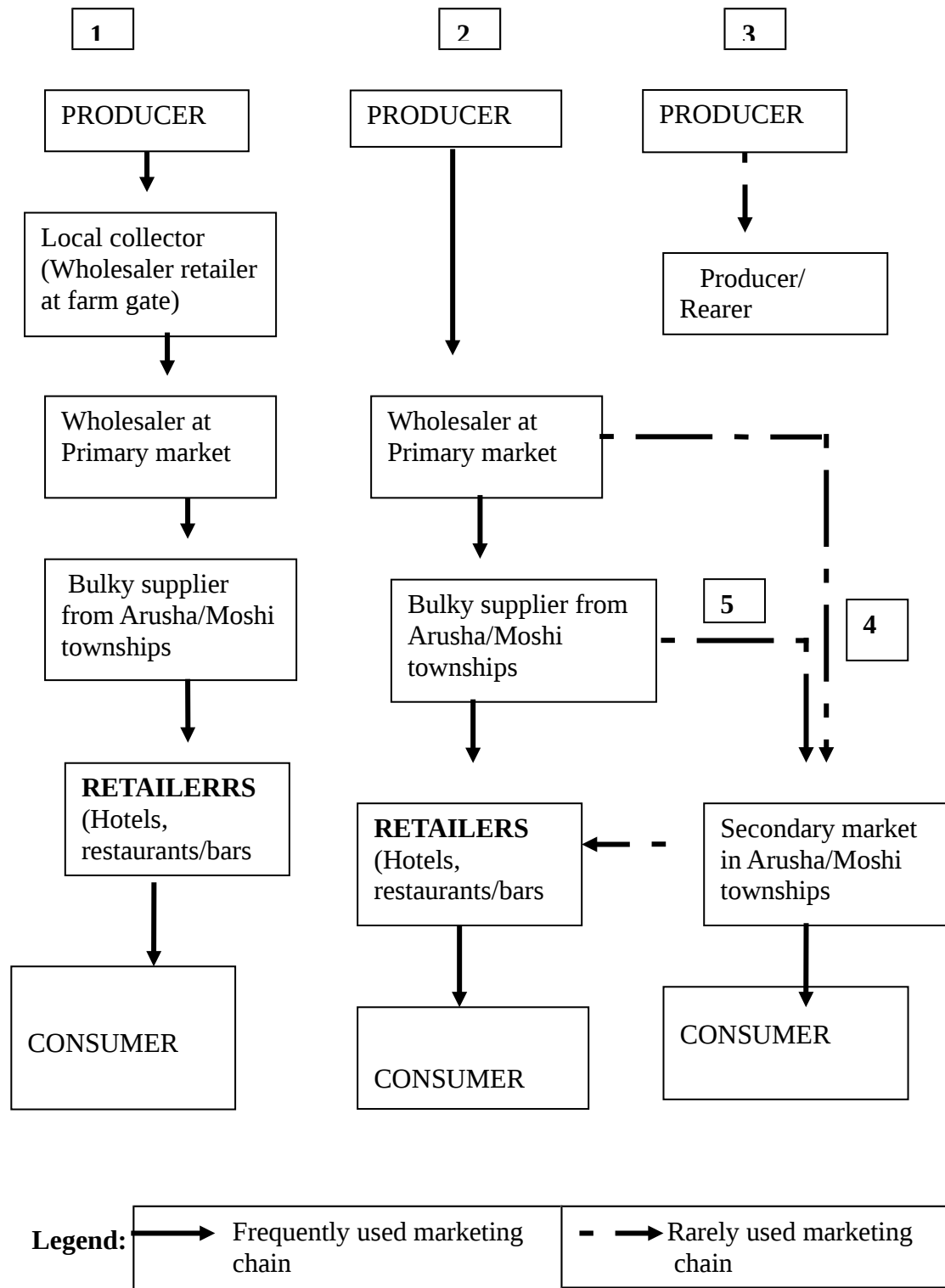
In this study, two frequently used major market chains are identified (Fig. 6). The first chain started from producers through local collectors at farm gate. The local collectors, who also acted as whole sellers at primary markets, sold the chickens to bulky suppliers who bought the chickens at primary markets. The bulky suppliers sold the chickens to hotels, restaurants/ bars (retailers). The latter sold to consumers.



**Legend:** Frequently used marketing chain Rarely used marketing chain

branch where the... point before reaching the designated area, provided that the customer was willing to pay a profitable price for the chickens to a trader.

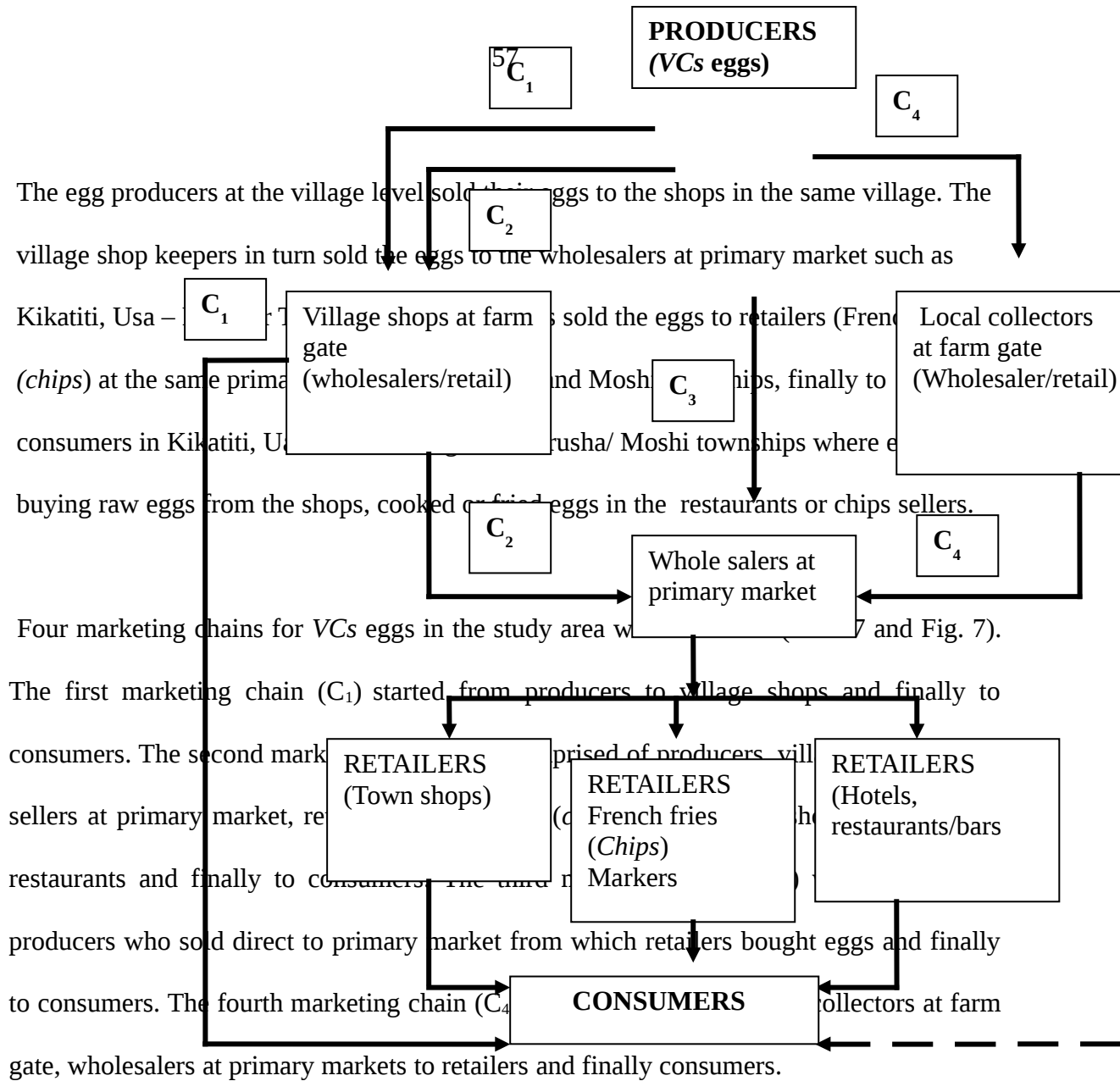


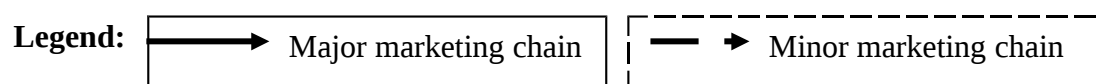


**Figure 6: Marketing chains of VCs in the study area**

#### **The marketing chain of VCs eggs in the study area**

Marketing chain of the eggs started at the village level to village shops. From the village shops to primary market, town shops / chips markers/restaurants ending to consumers.





**Figure 7: Marketing chains VCs eggs in the study area**

- **Definitions of the following items (C<sub>1</sub>- C<sub>4</sub>)**

C<sub>1</sub> - First Marketing chain of the eggs starting at the village level to village shops ending to consumer in towns such as Usa – River, Arusha or Moshi townships.

C<sub>2</sub> - Second marketing chain starting from egg producers at the village level, to the wholesaler at primary market such as Kikatiti, Usa River or Tengeru, sold to retailers (French fries (*chips*) in the same primary market or to Arusha and Moshi townships, finally to consumers.

C<sub>3</sub> - Third marketing chain started by producers in the village, direct to primary market to retailers (French fries (*chips*) at primary market or town shop keeper and hotel/restaurants in Arusha/ Moshi townships finally to consumers.

C<sub>4</sub> - Fourth Marketing chain involved producers in the village to local collectors at farm gate, wholesalers at primary market to retailers in the same primary market or Arusha/Moshi township markets, town shop keepers, hotels/restaurants and finally consumers.



**Plate 7: Examination of VCs eggs by a wholesaler before buying at a primary market**

#### **4.15.4 Market opportunities of VCs, in the study area**

According to the study, the market opportunities did exist in the study area, due to unfulfilled demand for the VCs in Arusha/Moshi townships. This demand is particularly met through importation of birds from Singida, Kondo, Babati and Mbulu.

All wholesalers (100%) responded that the chief markets for VCs from the study area were Arusha and Moshi townships. Furthermore, 88.1% of the traders responded that they had experienced a period of high demand for, and low supply of, VCs, which resulted in high prices. The period of low supply were April and between July and December.

The reasons for high price for VCs in the same months included:

- (i) Reluctance of the farmers in the study area and neighbouring districts and regions to sell chickens during and after the harvesting period,
- (ii) High demand for VCs in Arusha and Moshi townships during the period of crop harvesting and holidays. Traders revealed that celebrations for holidays such as

Easter, Idd, Farmers' Day and increased number of business people in Arusha and Moshi townships increased the demand for VCs whereas supply of chickens lagged behind resulting in increased price,

- (iii) Indirectly caused by high tourist season in Arusha townships (tourism increased the rate of money circulation among the residents of Arusha township).

These explanations are in line with what Manified (2004) who explained that a shift to the right in the demand curve occurs due to increase in demand or a shift in the supply curve to the left (decrease in supply will cause price to rise).

#### 4.16 Constraints Encountered by VCs Traders in the Study Area

Respondents were asked about the problems they encountered in the VCs business and their solutions. The results are presented in Table 20. The wholesalers faced several constraints in buying the VCs, such as buying stolen chickens, market fluctuations and more time taken in price negotiation. The wholesalers attempted to solve these constraints by paying for stolen chickens, paying low prices for sick chickens, paying a competitive price during high price seasons or to surrender the chicken to avoid spending more time on bargaining (Table 20).

**Table 20: Buying Constraints encountered by the wholesaler and their solutions**

<b>Variable</b>	<b>Frequency</b>	<b>Percent</b>
<b>Buying constraints:</b>		
Buying stolen or sick chickens	23	67.6
Market fluctuation	9	26.5
Take time in bargaining	2	5.9
<b>Total</b>	<b>34</b>	<b>100.0</b>
<b>Solutions to buying constraints:</b>		
Payment for stolen chicken, less price for sick chickens	21	61.8
Paying a competitive price during high price season	10	29.4
Surrendering the chickens to avoid more time in bargaining	3	8.8
<b>Total</b>	<b>34</b>	<b>100</b>

With regard to selling (Table 21), the constraints were losses due to chicken death, unreliable market, loss due to purchase of stolen, or loss due to sick chickens (sick chickens were sold at lower prices). However, the wholesalers responded to have no solution to loss due to chicken death, or for unreliability of market.

**Table 1: Selling Constraints encountered by the wholesalers and their solutions**

<b>Variable</b>	<b>Frequency</b>	<b>Percent</b>
<b>Selling constraints:</b>		
Losses due to death of chickens	16	51.6
Un reliable market	11	35.5
Stolen, or sick chicken	4	12.9
<b>Total</b>	<b>31</b>	<b>100.0</b>
<b>Solution to selling constraints:</b>		
No solution to loss due to death of chickens	16	51.6
No solution to unreliable market	11	35.5
Pay for a stolen chicken, less price for sick chicken	4	12.9
<b>Total</b>	<b>31</b>	<b>100.0</b>

As for the hotels restaurants/bars, the main constraints in buying the VCs were high price of the chickens during high sale period (80.0%), while the consumer price remained the same. Sometimes small size chickens were sold at the same price as large chickens (20.0%). The hoteliers said they had no solutions to both constraints.

On the other hand, the hotels, restaurants/bars (Table 22), were constrained by having few customers during low sale season (33.3%), death of chickens from diseases or suffocation (33.3%), loss due to fluctuation of prices (16.7%) and complaints by the customers due to small body sizes of chickens (16.7%). The respondents further concluded that, among the mentioned problems, only death of chickens due to suffocation had solution which was to provide chickens with enough ventilation during transportation (33.3%).

**Table 22: Constraints to selling VCs encountered by hoteliers**

<b>Variable</b>	<b>Frequency</b>	<b>Percent</b>
Few customers during low sale season	2.0	33.3
Death of chickens from diseases or suffocation	2.0	33.3
Loss due to fluctuating prices	1.0	16.7
Complaints on small body size of chickens	1.0	16.7
<b>Total</b>	<b>6.0</b>	<b>100.0</b>

As for consumers, the majority did not experience problems either in purchasing of chicken dishes or eggs (Table 23).

**Table 23: Constraints encountered by consumers in buying and eating VCs**

<b>Constraints</b>	<b>Frequency</b>	<b>Percent</b>
<b>Buying constraints:</b>		
No problem	18.0	54.5
High price during the high seasons	7	21.2
Sick, emaciated, too old chickens	4	12.1
Take more time for bargaining	3	9.1
Unavailability of VCs	1	3.0
<b>Total</b>	<b>33.0</b>	<b>100.0</b>
<b>Eating constraints</b>		
No problem	25	75.8
Too tough meat to chew	6	18.2
Died before being slaughtered	2	6.1
<b>Total</b>	<b>33</b>	<b>100</b>

#### **4.17 Assessment of the Market Margins of VCs and Eggs at each Chain Level**

##### **4.17.1 Market information and market price**

All producers of VCs obtained price information from their fellow farmers or by observing the market situations of VCs at the market centres or observing the price paid by local collectors at farm gate. For example sometimes the wholesalers at market points scrambled for purchasing the VCs or local collectors paid for the birds without negotiation with the farmers. These indicated high demand for VCs which ultimately raised the price. When these observations did not prevail, it was an indication of low demand for VCs and, therefore, low price was experienced.



The traders obtained price information by observing the market situation which was guided by supply and demand of VCs in the market centres. Then the information was transmitted to the fellow traders through mobile phones, and the majority of traders possessed mobile phones.

The market price of VCs in the area of study was determined by supply and demand of VCs in the market. There was a high price season and a low price season. All farmers said that, the season of high price was mainly experienced during crop harvesting and holidays. Whereas, low price was experienced during off seasons where there was no harvesting and holidays. Furthermore low prices were also experienced when there was disease outbreak such as Newcastle Disease which forced the producers to sell high numbers of chickens, and therefore increased supply of chickens.

#### **4.17.2 Estimation of marketing margins and total gross margin of VCs and eggs**

The marketing margins as well as total gross margins of VCs and eggs in the study area were estimated with the Microsoft Excel package using equation as indicated in the materials and methods section (Amir and Knipscheer 1989).

#### **Marketing margins analysis of chickens through chain 2**

The results in Table 24 show marketing margins as a proportion of final consumer price, following market chain 2 as indicated in Fig. 5. The marketing margin for VCs increased between the market levels when considering the marketing margins percent for the cocks. The local collectors in primary markets had a margin of about 9.2 % of final consumer price; the bulky suppliers' margin was 12.2 % whilst the hotels, restaurants/ bars had a margin of 15.0 %. This indicates that the largest portion in chain 2 went to hotels,

restaurants and bars. The trend was the same for hens. It shows that the large marketing margin portion in chain 2 went to hotels, restaurants/ bars probably due to the value added to processed chicken meat.

The marketing margin between the hotels/restaurants/ bars for hens was higher (31.1%), probably because in hotels, restaurants/bars the price for hens was almost the same as that for cocks, where as at the levels of producers local collectors and bulky suppliers, the price of hen was much lower compared to that of cocks. However, the proportion of final (consumer) price that went to the farmer was 63.4%, 52.5% and 40.5% for cock, hen and grower respectively. A study done by Gausi *et al.* (2004) in rural Malawi indicated that the largest portion of marketing margin (31.3%) of final consumer price went to rural assemblers, whilst the retailer's marketing margin constituted about 12.5% of final consumer price.

**Table 24: Marketing margins of VCs in the study area**

Market chain actors	Average Buying prices (TS)			Average Selling prices (Tsh)			Gross Marketing margins percent		
	Cock	Hen	Grower	Cock	Hen	Grower	Cock	Hen	Grower
Producer/farmer	-	-	-	6068.18	4845.59	2826.43	-	-	-
Local collector/primary market	6068.18	4845.59	2826.43	6954.54	5764.71	3500.00	9.2	9.9	9.6
Bulky supplier	6954.54	5764.71	3500.00	8125.00	6375.00	4500.00	12.2	6.6	14.3
Hotel/restaurant/bar	8125.00	6375.00	4500.00	9600.00	9250.00	7000.00	15.0	31.1	35.7
Final consumer price	9600.00	9250.00	7000.00	-	-	-	-	-	-

### **Profit margins analysis VCs (along market chain 2)**

Table 25 presents the total revenue earned, costs incurred and profit margins per bird at each stage of the chain. The results show that, among the traders bulky suppliers obtained highest profit from cocks. Probably, it was because in most cases, the bulky suppliers were

buying mixed sizes of cocks at wholesale price, but they were discriminating prices for each sex and size when they sold to hotels/restaurants and bars.

However, during the study it was observed that farmers were rewarded by selling cocks and hens (TSH 2 234.03, and 1 104.40) respectively, but they incurred losses in selling the growers (TSH - 940.47). So although the farmer gets 45.5% of the final price for the growers, examining the cost structure showed that variable costs which were TSH 3 766.9 per grower were higher than the price of TSH 2 826.4 which received by the farmer. The gross profit margins for cocks and hens were positive (Table 25).

Table 25: Profit margins analysis along chicken market chain (Tsh)

Marketing chain actors, class of Chickens/egg sold	Mean annual total number of birds Bought	Mean annual total number of birds sold	Mean buying price per bird	Mean selling price per bird	Mean annual total revenue	Mean total variable cost per bird	Mean annual total variable cost	Gross Profit margin per bird	Percent gross profit margin per bird/egg
<b>Producer/Farmer:</b>									
Cocks	-	14	-	6068.18	84 954.52	3 834.15	53 678.13	<b>2 234.03</b>	<b>36.8</b>
Hens	-	10	-	4845.59	48 455.90	3 741.20	37 412.03	<b>1 104.40</b>	<b>22.8</b>
Growers	-	19	-	2826.43	53 702.17	3 766.90	71570.84	<b>- 940.47</b>	<b>- 33.3</b>
<b>Wholesaler at primary market:</b>									
Cocks	1521	1521	6068.18	6954.54	10 577 855.34	200.00	304 200	<b>686.36</b>	<b>9.9</b>
Hens	1060	1060	4845.59	5764.71	6 110 592.60	200.00	212 000	<b>719.12</b>	<b>12.5</b>
Growers	2027	2027	2826.43	3500.00	7 094 500.00	200.00	405 400	<b>473.57</b>	<b>13.5</b>
<b>Bulky suppliers</b>									
Cocks	1521	521	6954.54	8125.00	12 358 125.00	270.00	410 670.00	<b>900.46</b>	<b>11.1</b>
Hens	1060	1060	5764.71	6375.00	6 757 500.00	270.00	286 200.00	<b>340.29</b>	<b>5.3</b>
Growers	2027	2027	3500.00	4500.00	9 121 500.00	270.00	547 290.00	<b>730.00</b>	<b>16.2</b>
<b>Hotel, restaurant/bar</b>									
Cocks	1800	1800	8125.00	9600.00	17 280 000	1000.00	1800000.00	<b>475.00</b>	<b>4.9</b>
Hens	29160	29160	6375.00	9250.00	269 730 000	1000.00	29160000.00	<b>1875.00</b>	<b>20.3</b>
Growers	8400	8400	4500.00	7000.00	58 800 000.00	1000.00	8400000.00	<b>1 500.00</b>	<b>21.4</b>

### **Marketing margin analysis of VCs eggs in the study area**

The results in Table 26 show the marketing margins of various market chains of the VCs eggs as a proportion of final consumer price. The results show that the highest market margin was obtained by hotels, restaurants/bars (40%) marketing margin as a proportion of final consumer price. Probably this might be due to low average buying price per egg (TSH 210 per egg) experienced by mentioned market actors, whereas, the average selling/consumer price per egg was high (TSH 350 per egg).

During the study it was also observed that the marketing margin for village shops was 16.7% of the final consumer price, while that of local collectors was 12.3% of the final consumer price. Probably it was because in the village the egg price for final consumers was less (TSH 180) per egg compared to egg price for final consumer for local collectors, which was TSH 283.33 per egg).

Furthermore, the French fries (*chips*) markers indicated the marketing margin of 16% of the final consumer price, which was the same as that of town shops (16%), due to the fact that both of them bought the eggs for the same price (TSH 210). The egg was also sold/consumed at the same price (TSH 250) per egg (Table 26). Another reason was that the two market actors were doing their businesses in similar locations, i.e. townships.

The primary market traders captured the marketing margin of 4.7%, of final consumer price. The reason for that might be due to competition for eggs both at primary market and in towns by traders, hence there was minor increase in egg average sale price (TSH 203.33) per egg, whereas the final consumer average price was TSH 283.33 per egg.

**Table 26: Marketing margins of VCs eggs**

<b>Market chain actors</b>	<b>Average buying price per egg (Tsh)</b>	<b>Average selling &amp; final consumer price per egg (Tsh)</b>	<b>Market Margin (%)</b>
Producer/farmer	-	150.00	-
Village shop	150.00	180.00 (180) <sup>2,3</sup>	16.7
Local collector	155.00	190.00 (283.33) <sup>4</sup>	12.3
Bulky supplier	190.00	210 (283.33) <sup>5</sup>	7.1
Chips marker (retailer)	210.00	250.00 (250.00)	16.0
Town shop (retailer)	210.00	250.00 (250.00)	16.0
Hotel/Restaurant and Bar(retailer)	210.00	350.00 (350.00)	40.0

**Legend:** The numbers in the brackets are final consumer prices

The number 2 - 5 subscripts are the numbers for types of market chains given below

#### 4.17.3 Profit margins analysis of VCs eggs

The results in Table 27 present the total revenue earned, variable costs incurred, and profit margins per egg at each stage of the chain. The results show that, traders, hotels, restaurants and bars obtained highest profit (TSH 90), per egg. This could be explained by the selling price which was higher compared to other nodes.

The findings of the present study contradict the findings obtained by Mlozi *et al.* (2003) and Gausi *et al.* (2004) in Tanzania and Malawi, respectively who revealed that middlemen benefited more than farmers in the marketing chain of free range chickens.

<sup>2</sup> Producer selling to consumer through village shops.

<sup>3</sup> Producer selling to consumer through village shops – primary markets – town shops, chips markets hotels/restaurants/bars

<sup>4</sup> Producer selling to consumer through village shops – primary markets – town shops, chips markers, hotels/restaurants/bars

<sup>5</sup> Producer selling to consumer through local collector – primary market – town shops, French fries (*chips*) markers, hotels /restaurants /bars.

**Table 27: Profit margin analysis along the egg market chain (Tsh)**

<b>Market chain actors, Eggs</b>	<b>Mean annual total number of eggs bought</b>	<b>Total deteriorated eggs</b>	<b>Mean annual total number of eggs sold</b>	<b>Mean buying price per egg</b>	<b>Mean selling price per egg</b>	<b>Mean annual total revenue</b>	<b>Mean total variable cost/egg</b>	<b>Mean annual total variable cost per year</b>	<b>Profit margin per egg</b>
Farmer (Producer)	-		360	-	150	54,000	-	-	-
Village shop	4,680	156	4524	150	180	814320	160	748 800	14
Local collector	22,980	-	22 980	155	190	4 366 200	165	3 791 700	25
Bulky supplier	22,980	-	22 980	190	210	4 825 800	200	4 596 000	10
Chips marker (retailer)	11,490	-	11 490	210	250	2 872 500	230	2 642 700	20
Town shop (retailer)	5745	-	5745	210	250	1 436 250	220	1 263 900	30
Hotel/restaurant and Bar (retailer)	5745	-	5745	210	350	2 010 750	260	1 493 700	90

#### **4.18 Limitations of the study**

The study was largely constrained by insufficient production and marketing records from the market chain actors. Some of them did not keep records and thus relied on recall. The study also encountered a problem of low level of transparency on business operations for some of the traders particularly at primary market centres. Information on the buying and selling prices, the quantity of chickens bought and sold was regarded as confidential. In some cases some of the traders were not ready to disclose such information for fearing that it might leak out to tax authorities. This limitation affected precision in some of data collected which ended up to standard deviation that was large relative to the mean.

These efforts included formal introduction of the researcher as well as her assistant to the influential, long experienced traders to explain to them the importance of the study to the future VCs business. Furthermore, use of the local Meru language by the researcher increased the trust of the traders on the researcher and her assistant.

Lastly, the market margins and profit margins analyzed were not sufficient measures of profitability since they did not take into account the fixed costs. However, they were important indicative measures of profitability.



## CHAPTER FIVE

### 5.0 CONCLUSION AND RECOMMENDATIONS

#### 5.1 Conclusion

The study observed that production performance of VCs in the study area was promising in terms of age at first lay, hatchability percent and adult survival rates. The production performance of the chickens was poor in egg production per hen per clutch, number of clutches per hen per year and chick survival rates.

Egg production per hen per clutch, number of clutches per hen per year were poor probably due to poor genetically make up of the village chickens as well as lack of proper managements to the birds such as feeding, treatment, housing and long period of chick rearing by their mothers (hens) which resulted to  $3.2 \pm 0.8$  mean clutches per hen per year. The study indicated that, 51.3% of chick mortalities were due to diseases despite of various drugs and herbs farmers gave their birds for treatments. Whereas, 42.9% of chick mortalities were caused by predators. The reasons for chick mortalities due to diseases probably might be due to:

- Poor knowledge in disease diagnosis hence wrong treatment,
- The proper dosage either not followed, and,
- Drugs administered to the chicks while were under stress condition with ought the stress being controlled or treatment done while the drugs have been expired.

High mortalities caused by predators were indication that chicks were not well protected against predators at the age below 10 weeks. The market chain for live chickens and eggs differed whereby there were two major chains in live birds and three minor ones, while for eggs there were four major chains.

A period of high demand for VCs especially during festivals and low supply of VCs resulted in high prices and were regarded as market opportunities.

The highest marketing margin was obtained by hotels, restaurants and bars, while the bulky supplies obtained the highest profit margin in cocks. However, the present study observed that farmers were rewarded by selling cocks as well as hens but incurred losses in selling growers. Growers were sold for the purpose of both rearing and consumption.

Under normal circumstances farmers usually sell mature cocks /hens and not growers. The present study indicated farmers were selling mature cocks, hens as well as growers. These were due to the fact that, farmers in those areas mostly produced VCs for the purpose of selling to meet family needs and rarely for home consumptions. Thus, whenever need arises any type of chicken had to be sold regardless of the age or sex.

## **5.2 Recommendations**

The following are the pertinent recommendations to improve VCs production;

- i) Farmers should sell the growers at the price meant for production purposes rather than for consumption to get the satisfactory prices, since the traders buy at lower prices for profit maximization.
- ii) For sustainable and profitably VCs industry, VCs keepers as well as traders should be trained and facilitated on how to keep records; importance of keeping records; and how to monitor and evaluating those records. These should be done by either extension workers or private sectors that are expertises on those particular disciplines.

- iii) Farmers had inadequate knowledge on poultry husbandry and business know-how. Thus, poultry husbandry and entrepreneurial courses that focus on VCs as a farming business should be conducted to the farmers also; the traders should be trained on business running and disease diagnosis for the chickens in order to avoid losses due to deaths of chickens.
  
- iv) Farmers should be Motivated to form farmers groups so as to decrease the large number of layers of upstream actors that lower the share of the price received by the farmers.

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## APPENDICES

### Appendix 1: Questionnaire for performance of village chickens

#### A: Questionnaire for farmers

##### a) Demographics of the farmers

#### 1. Name of a farmer.....

i). Sex..... ii). Age.....

iii) Number of people per household.....

iv) Level of education.....v). Source of income.....

vi) Size of land.....Ha (at the home stead)

#### 2. Location

Ward..... Village.....

#### 3. Who owns the birds?

i) Husband ii) Wife

iii) Husband and wife

iv) Wife and children




#### 4. How did you acquire your chickens?

i) Buying by cash

ii) Butter system

iii) Gift from the relatives

iv) Others (specify).....




#### 5. Purpose of keeping the chickens

i) Business

ii) Home consumption

(iii) Others (specify) .....

6. For how long have you been involved in keeping chickens?

i) = (1 year)

ii) = (2 years)

iii) = (3 years and above)

7. Class and number of birds owned

i) Hen (a female bird which can lay an egg) .....

ii) Cocks (a male bird which can mate).....

iii) Growers 8- 16 weeks old)

iv) Chicks (1- 8 weeks old)

8. Breed of chicken kept

i) Indigenous

ii) Cross

iii) Exotic

9. At what age (month) do hens start laying? .....

10. How many clutches per annum does each chicken have?

a. = 1

b. = 2

c. = 3

d. = 4

e. = 5

11. How many eggs are laid per clutch during?

a) Wet season .....

b) Dry season.....

12. How many eggs are set for hatching per hen? .....



13. What is the hatchability percentage per hen during?

i) Dry season.....

ii) Wet season .....

14. What is the percentage of chick survival in?

i) Dry season .....

ii) Wet season .....

15. What is the cause of mortality in? (Tick)

**i) Chicks:**

a) Predator

b) Diseases

c) Accident

d) Others (specify).....

**ii) Growers:**

a) Predator

b) Diseases -

c) Accident

d) Others (specify).....

**iii) Adults**

a) Predators

b) Diseases

c) Accident

d) Others (specify).....

16. What are the leading killer diseases? In:

i) Chicks.....

ii) Growers.....

iii) Adults.....

## 17. Management systems of village chicken

What type of rearing system do you use?

- i) Scavenging
- i) Semi intensive system
- iii) Others (specify).....

## 18. Do you provide your chicken with supplementary feed? Yes/ No

i) If yes, which feed? ..... ii) If No why? .....

## 19. Is there any difference when you provide your chicken with supplementary feed? Yes/

No

## 20 If yes, what is the result when you provide your chicken with supplementary feed?

- i) Increase in growth of the chicken
- ii) Increase in egg production
- iii) Both
- iv) None of the above

## 21. Do you provide your birds with shade? Yes /No

## 22. If yes, what type of floor is used.....

**b) Chicken improvement**

## 23. Have you ever used improved cock breed? Yes/ No

## 24. If yes, how did you obtain the cock?

- i) Personal (buying)
- i) Government
- iii) Others (specify).....

## 25. What was the breed of the cock? .....

## 26. If No, why do you not use the improved cock breed? .....

**c) Managements improvement after using improved cock breed**

27. Did you improve management after using the improved cock breed? Yes/No

28. If yes, what improvement have you done? .....

**(For those who did not used improved cock breed)**

29 Are you planning to use improved cock breed? Yes/No

30. If Yes state the reason.....

31. If No state the reason.....

**d) Supportive agencies**

32. Do you get any support from?

i) Extension agency?

ii) Organization agents

iii) Any other (specify).....

33. Quality of service offered

Client	Rank				
	Very good	Good	Average	Below average	Poor

**e) Disease control and treatments by using veterinary drugs**

34. Do you vaccinate your flock against diseases Yes/No?

35. If yes, what is the type of vaccine(s) used? .....

36. What was the result after the vaccination? .....

37. If no, why? .....

38. Do your chickens receive some treatment Yes /No

39. If Yes specify the prophylaxis/curative .....

What disease(s).....

Result after the treatment.....

40 If No, why? .....

**f) Disease control and treatments by using herbs**

41. Do you use any herbs Yes /No

42. If yes which herb(s) .....

43 Results after using herbs

44. If no why.....

**g) Contributions of poultry to Family income**

45. What is the contribution of poultry in the following items? (Tsh)

- i) Housing..... ii) Education.....
- iii) Farm input ..... iv) Household Assets.....
- v) Food security..... vi) Others (specify).....

**h) Marketing for village chickens**

46. How often do you slaughter chicken for home consumption?

- i) Once / week
- ii) Once per 2 weeks
- iii) Once / 3 weeks
- iv) Once / 4 weeks
- v) Others (specify)..... ..

47. On average how many chicken do you sale /month? .....

48 Where do you sell your chickens?

- i) Neighbours

- ii) Local collectors
- iii) Direct to Market
- iv) Any other (mention).....

49) If not selling why? .....

50. If selling, who is involved in the market chain?

- i) Husband; ii) wife; iii) children; iv) husband and wife; v) wife and children

**i) Income form chicken and chicken products (Tsh)**

**51 Selling prices**

**Price per:**

- i)Cock ..... ii) Hen..... iii) Egg.....
- iv) Growers (2 months and above) .....

**52. How many of the following products are you selling per month?**

- i) Cock ..... ii) Hen..... iii) Growers (2 months and above)..... iv) Egg .....

**53. At what age are you selling the chicken?**

- i) For meat?..... ii) For rearing? .....

**(The above given answers should be extrapolated per annum)**

54. Are you satisfied with the income you are getting from the chicken production

Yes/No.....

- i) If no why? .....

**55. What are the problems that you encountering in selling the chicken and chicken products? (Rank).**

- i).....ii.)..... iii).....

**56. How are you dealing with the problems?**

Problem	Solution

**j) Cost incurred in the production of the chickens****57. The costs (Tsh) per year**

- i) Housing/ shading.....ii) Feeding/ supplement feeding.....
- iii) Water.....iv) Transport.....
- ii) Type of Labour (hired or house hold member?).....
- If hired: Labour cost.....

**If house hold member:**

- i).Time spent..... ii) Going wage for equivalent type of labor.....

**THANK YOU**

**Appendix 2: Questionnaires for village chicken and egg Traders**

**B: Questionnaire for Local Collectors at farm gate and primary market**

**Demographic characteristics**

1. Name.....

i) Sex..... ii) Age..... iii) Level of education.....

**2. Location**

Ward..... Village.....

**Buying;**

3. Where are the main sources of chicken you buy? .....

4. Price (Tsh) per:

i) Cock ..... ii) Hen ..... iii) Grower

**5. Costs: (Tsh)**

i) Transport..... ii) Labour..... iii) Feed' .....

iv) Water..... v) Tax.....

**Selling;**

6. Price (Tsh) per:

i) Cock .....ii) Hen ..... iii) Grower.....

7. What are monthly selling/income? .....

8. When is the season of?

(i) High price.....

Reasons.....

(ii) Low price.....

Reasons.....

9. Profit margin from the chicken and chicken products (Tsh)

i) Cock .....ii) Hen ..... iii) Grower .....

10. Are you satisfied with the profits you are getting from the chicken business? Yes/No

i) If No why.....

11. What are the constraints that you encounter in buying and selling the chicken?

**a) Constraints in buying (rank)**

i) .....ii) .....iii) .....

b) How are you dealing with the constraints? (Solutions)

i).....ii)..... iii).....

**c) Constraints in selling (rank)**

i)..... ii)..... iii).....

d) How are you dealing with the constraints? (Solutions)

i)..... ii)..... iii).....

12. Do you get any support from?

i) Extension agency..... ii) Financial Service (list).....

iii) Traders associations (list).....

vi) Any other (list).....

13. Quality of service offered

Clients( by whom)	Rank				
	Very good	Good	Average	Below average	Poor
Extension agency					
Financial Service					
Financial Service					
Any other					

**THANK YOU**

**C: Questionnaire for Bulky suppliers**

**Demographics characteristics**

**1. Name.....**



i) Age..... ii) Sex.....

iii) Level of education..... iv) Source of income.....

**2. Location**

Ward..... Village.....

**Buying:**

3. What are the main sources of chickens you buy? .....

4. Price (Tsh) per:

i) Cock..... ii) Hen ..... iii) Grower.....

5. Costs: (Tsh)

i) Transport..... ii) Labour..... iii) Feed.....

iv) Water..... v) Tax.....

**Selling;**

6. Price (Tsh) per:

i) Cock..... ii) Hen..... iii) Grower .....

7. What are average monthly selling/income from? Chickens.....

Eggs.....

8. When is the season of?

(i) High price.....

Reasons.....

(ii) Low price.....

Reasons.....

9. Profit margin from the chicken and chicken products (Tsh)

i) Cock ..... ii) Hen ..... iii) Grower .....

10. Are you satisfied with the profits margins you are getting from the chicken business?

Yes/No

i) If No why? .....

11. What are the constraints are you encountering in buying and selling the chicken?

i) Constraints in buying (specify) .....

ii) Constraints in selling (specify).....

iii) How are you dealing with the constraints?  
.....

12 Do you get any support from?

i) Extension agency (List).....

ii) Financial agency (list).....

ii) Traders associations (list).....

iv) Any other (list).....

13. Quality of service offered

Clients( by whom)	Rank				
	Very good	Good	Average	Below average	Poor
Extension agency					
Financial agency					
Traders associations					
Any other					

**THANK YOU**

**D: Questionnaire for Retailers (Hotels, restaurants/bars)**

**Demographics characteristics**

1. Name of the hotel manager.....

- i) Sex..... ii) Age.....  
 iii) Level of education..... iv) Source of income.....

**2. Location**

Ward / Town.....

**Buying:**

3. What are the main sources of chicken you buy? .....

**4. Price (Tsh) per:**

i) Cock..... ii) Hen ..... iii) Grower..... iv) Egg.....

**5. Costs: (Tsh)**

i) Transport..... ii) Labour.....iii) Tax.....iv) House rent.....

**Selling;**

**6. Price (Tsh) per:**

i) Cock..... ii) Hen..... iii) Grower..... iv) Egg .....

7. What are average monthly selling/income from? Chickens.....

Eggs.....

8. When is the season of?

(i) High price.....

Reasons.....

(ii) Low price.....

Reasons.....

9. Profit margin from the chicken and chicken products (Tsh)

i) Cock ..... ii) Hen ..... iii) Grower ..... iv) Egg.....

10. Are you satisfied with the profits you are getting from the chicken business? Yes/No

i) If No why? .....

11. What are the constraints are you encountering in buying and selling the chicken and chicken products

- i) Constraints in buying (specify) .....
- ii) How are you dealing with the Constraints? .....
- iii) Constraints in selling (specify).....
- iv) How are you dealing with the Constraints?  
.....

12 Do you get any support from?

- i) Extension agency (list).....
- ii) Financial agency (list)
- iii).Traders associations (list).....
- iv) Any other (list).....

13. Quality of service offered

Clients( by whom)	Rank				
	Very good	Good	Average	Below average	Poor
Extension agency					
Financial agency					
Traders associations					
Any other					

**THANK YOU**

**E: Questionnaire for Secondary market traders (Arusha township)**

**Demographics characteristics**

- 1. Name..... i) Sex..... ii) Age.....
- iii) Level of education..... iv) Source of income.....

**2. Location**

Ward / Town.....

**Buying:**

3. What are the main sources of chicken you buy?

.....

**4. Price (Tsh) per:**

i) Cock..... ii) Hen ..... iii) Grower.....

**5. Costs: (Tsh)**

i) Transport..... ii) Labour..... iii) Tax.....

iv) Rent..... v) Feed.....

**Selling;**

**6. Price (Tsh) per:**

i) Cock..... ii) Hen..... iii) Grower.....

7. What are average monthly selling/income from? Chickens.....

8. When is the season of?

(i) High price.....

Reasons.....

(ii) Low price.....

Reasons.....

9. Profit margin from the chicken (Tsh)

i) Cock..... ii) Hen ..... iii) Grower.....

10. Are you satisfied with the profits you are getting from the chicken business? Yes/No

i) If No why? .....

11. What are the constraints are you encountering in buying and selling the chicken?

i) Constraints in buying (specify) .....

ii) How are you dealing with the Constraints?

iii) Constraints in selling (specify).....

iv) How are you dealing with the Constraints? .....

12 Do you get any support from?

i) Extension agency (list).....

ii) Financial agency (list)

iii) Traders associations (list).....

iv) Any other (list).....

13. Quality of service offered

Clients( by whom)	Rank				
	Very good	Good	Average	Below average	Poor
Extension agency					
Financial agency					
Traders associations					
Any other					

**THANK YOU**

**F: Questionnaire for Egg traders**

**Demographics characteristics**

1. Name.....

i) Sex..... ii) Age..... iii) Level of education.....

iv) Source of income.....

**2. Location**

Town..... Ward..... Village.....

**Buying:**

3. What are the main sources of eggs you buy? .....

4. Price (Tsh) per egg.....

**5. Costs: (Tsh)**

i) Transport..... ii) Labour.....

**Selling;**

6. Price (Tsh) per egg.....

7. What are average monthly selling/income from? Eggs.....

8. When is the season of?

(i) High price.....

Reasons.....

(ii) Low price.....

Reasons.....

9. Profit margin from the egg (Tsh).....

10. Are you satisfied with the profits you are getting from the egg business? Yes/No

i) If No why? .....

11. What are the constraints are you encountering in buying and selling the egg?

i) Constraints in buying (specify) .....

ii) How are you dealing with the Constraints? .....

iii) Constraints in selling (specify).....

iv) How are you dealing with the Constraints? .....

12 Do you get any support from?

- i) Extension agency (list).....
- ii) Financial agency (list).....
- iii).Traders associations (list).....
- iv) Any other (list).....

13. Quality of service offered

Clients( by whom)	Rank				
	Very good	Good	Average	Below average	Poor
Extension agency					
Financial agency					
Traders associations					
Any other					

**THANK YOU**

### **Appendix 3: Questionnaire for consumers**

#### **Demographics of the consumer**

1. Name of a consumer.....
  - i) Sex..... ii) Age..... iii) Level of education.....

#### **2. Location**

Town..... Ward..... Village.....

#### **Buying:**

3. How often do you buy? i) Chicken..... ii) Eggs.....



iii) Is there a time of the year when the price of chicken goes down/up? Yes/

iv) If yes state the season of low price..... (Month)

v) What do you think are the reasons for low price? .....

vi) State the season of high price..... (Month)

vii) What do you think are the reasons for high price? .....

4. Do you prefer to buy from the market or direct from the farmer? .....

5. Reasons.....

6. Price (Tsh) per:

i) Cock ..... ii) Hen ..... iii) Egg .....

7. Are you satisfied with the quality of birds you buy given the price? Yes/No

If no, why? .....

(ii) Eggs you eat? Yes/No

If No why? .....

8. Are you satisfied with the price of?

a) Chicken you buy? Yes/ No

i) If yes, Reasons.....

ii) If no, Reasons.....

b) Egg you buy? Yes/ No

i) If yes, Reasons.....

ii) If no, Reasons.....

9. Are you satisfied with the quality you are getting from eating:

a) The chicken? Yes/No?

i) If No why.....

ii) If yes, Reasons.....

b) The eggs? Yes/No?

i) If No why.....

ii) If yes, Reasons.....

10. What are the constraints are you encountering in buying and eating the chicken/ eggs

i) Constraints in buying (specify) .....

ii) How are you dealing with the constraints? .....

iii) Constraints in eating (specify).....

iv) How are you dealing with the constraints? .....

**THANK YOU**