

CHARACTERIZATION OF SMALLHOLDER POULTRY PRODUCTION AND  
MARKETING SYSTEM OF DALE, WONSHO AND LOKA ABAYA WEREDAS OF  
SOUTHERN ETHIOPIA

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M.Sc. THESIS

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NOVEMBER, 2007

APPROVAL SHEET-I

This is to certify that the thesis entitled “Characterization Of The Small Holder Poultry Production and Marketing System of Dale, Wonsho and Loka Abaya Weredas Of SNNPRS.” Submitted in partial fulfilment of the requirements for the degree of Master of Science in Animal sciences with a Specialization of Animal production of the Graduate Program of the Department of Animal and Range Sciences, Awassa college of agriculture, and is a record of original research carried out by Mekonnen G/Egziabher Muhiye I.D.No AWR/0018/98 under my supervision, and no part of the thesis has been submitted for any other degree or diploma.

The assistance and the help received during the course of this investigation has been duly acknowledged. Therefore, I recommend that it will be accepted as fulfilling the thesis requirements.

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We, the undersigned, members of the Board of Examiners of \_\_\_\_\_ have read and evaluated \_\_\_\_\_ and examined the candidate. This is therefore to certify that the thesis has been for the degree \_\_\_\_\_

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## TABLE OF CONTENTS

<b>LIST OF TABLES</b> .....	<b>viii</b>
<b>LIST OF FIGURES</b> .....	<b>ix</b>
<b>ACRONYMS</b> .....	<b>xi</b>
<b>ACKNOWLEDGEMENT</b> .....	<b>xii</b>
<b>DEDICATION</b> .....	<b>xiv</b>
<b>ABSTRACT</b> .....	<b>xv</b>
<b>1. Introduction</b> .....	<b>1</b>
<b>2. Literature review</b> .....	<b>6</b>
2.1. <i>Characterization of smallholder poultry production systems</i> .....	6
2.2. <i>Importance of the small holder chicken production systems</i> .....	8
2.3. <i>Socio economic aspects of poultry production</i> .....	9
2.3.1 Social and economic scenario .....	9
2.3.2. Decision making on and ownership of chickens .....	12
2.4. <i>Scenario of small holder poultry production management and marketing systems</i> .....	13
2.4.1. Feeding .....	13
2.4.2. Housing .....	14
2.4.3. Disease and predators .....	15
2.4.4. Marketing .....	15
2.5. <i>Extension interventions</i> .....	17
2.6. <i>Constraints</i> .....	18
2.6.1. Inadequate health care and poor feed source .....	18
2.6.2. Inadequate emphasis to research and extension .....	18
2.6.3. Lack of organized market and poor access to main market .....	19
2.6.4. Social and cultural constraints. ....	19
<b>3. Materials and methods</b> .....	<b>21</b>

3.1. Description of the study area .....	21
3.2. Sampling method and data collection .....	23
3.2.1. Sampling .....	23
3.2.2. Data collection .....	23
3.3. Statistical analysis.....	25
<b>4. Results and discussion .....</b>	<b>27</b>
4.1. Farming system .....	27
4.2. House hold characteristics.....	27
4.3. Respondent's profile .....	30
4.4. Flock structure and characteristics .....	32
4.5. Loss and off take .....	36
4.6. Chicken production system .....	37
4.7. Socio economic and intra household dynamics .....	38
4.7.1. Socio economic aspects of chicken production .....	38
4.7.2. Intra-household dynamics and labor profile .....	41
4.8. Productivity of local chicken.....	44
4.8.1. Age at first egg .....	44
4.8.2. Egg production .....	45
4.8.3. Hatchability and mortality.....	47
4.8.4. Body weight .....	49
4.9. Management practices .....	51
4.9.1. Feed and feeding practice.....	51
4.9.2. Watering .....	52
4.9.3. Housing .....	54
4.9.4. Predators and disease .....	54
4.10. Broody hen management.....	57
4.11. Marketing .....	61
4.11.1. Major characteristics of chicken markets.....	61
4.11.2. The plumage color of chickens in the markets.....	67
4.11.3. Profiles of sellers in the markets .....	68
4.11.4. Volumes of live birds and eggs marketed .....	69

4.11.5. Price of poultry and poultry products at farm gate .....	73
4.11.6. Seasonal variations in chicken price at local market .....	74
<b>5. Summary and conclusion .....</b>	<b>76</b>
<b>6. Recommendations .....</b>	<b>78</b>
<b>7. References .....</b>	<b>80</b>
<b>8. Appendices .....</b>	<b>89</b>

## LIST OF TABLES

Table 1. The major characteristics of the chicken production system in Africa.....	6
Table 2 Sampled wereda, kebeles and market places from each agro climatic zone for both production and marketing data collection.....	24
Table 3. Family, farm and chicken size of the surveyed Weredas.....	28
Table 4. Total live stock ownership in TLU per household of the three weredas .....	29
Table 5. Respondents' profile .....	31
Table 6. Flock size and proportion of the respondent owning different size of chicken .....	33
Table 7 Purpose of chicken and egg production .....	39
Table 8 Expenditure of the income from sale of chickens.....	40
Table 9 Reproductive performance of the hen based on hen history data obtained from the study village.....	44
Table 10. Body weight of chicken at farmers' hand .....	50
Table 11. Feed and feeding practice .....	53
Table 12. Scenario of disease outbreak and treatment.....	56
Table 13. Broody hen management .....	59
Table 14. Marketing characteristics of the study area.....	63
Table 15. Marketing channel of the three Weredas .....	73
Table 16. Farm gate chicken price in birr .....	74

## LIST OF FIGURES

Figure 1. Administrative weredas of Southern Nations, Nationalities and Peoples Region States (SNNPRS) indicating the former Dale wereda or the study area. ....	22
Figure 2. Proportions of chickens in the surveyed households.....	34
Figure 3. Off take and losses of chickens from the flock.....	36
Figure 4. Chicken ownership distribution among different gender groups in the study households.....	41
Figure 5. Intra household decision-making power among different gender groups .....	42
Figure 6. Intra household labor share among gender group with regard to various management duties in chicken production.....	43
Figure 7. Mortality of chicken at different age category .....	49
Figure 8. Picture showing mode of transportation for collector. ....	64
Figure 9. Value chain for indigenous poultry and eggs in the study area.....	66
Figure 10. Color composition of matured male and female chicken in the markets .....	67
Figure 11. Color composition of grower male and female chicken in the markets .....	68
Figure 12. Proportional distribution of sellers in the market with their educational background .....	69
Figure 13. Marketing channels for chicken predominately existing in the study area and volume of chicken marketed.....	71
Figure 14. Seasonal variations of chicken price (Data collected from five-selected markets from the study area) .....	75

## LIST OF TABLES IN APPENDICES

Appendix I. Total livestock distribution in (TLU) in three Weredas per total household.....	89
Appendix II. Conversion of livestock number to Tropical Livestock Unit (TLU).....	90
Appendix III. Literature on reproductive performance of chicken in free range rural village chicken production system in selected African countries.....	91
Appendix IV ANOVA for family, farm and chicken size of the surveyed area.....	92
Appendix V. ANOVA for performance of chicken in the study area.....	92
Appendix VI Questioner .....	<b>Error! Bookmark not defined.</b>
Appendix VII Photos taken from the market surveys.....	93

## ACRONYMS

AnGRs	Animal Genetic Resources
CSA	Central Statistical Authority
DZARC	Debrezeit Agricultural Research Center
EARO	Ethiopian Agricultural Research Organization
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agricultural Organization Statistics
GDP	Gross domestic product
ha	Hectare
HH	Household
ILCA	International Livestock Research Center for Africa
IPMS	Improving Production and Marketing Success
masal	meter above sea level
N	Number
ND	New castle Disease
NS	Not significant
PA	Peasant Association
PRA	Participatory Rural Appraisal
SE	Standard Error
SNNPRS	Southern Nations, Nationalities and Peoples Regional State
SPSS	Statistical Package for Social Sciences
TLU	Tropical Livestock Unit

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## DEDICATION

In memory of my wife, **Etsegenet Agonafir**, who passed away accidentally during my research work!

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ABSTRACT

*A longitudinal data collection (repeated survey) and a cross sectional survey was conducted in three weredas of southern Ethiopia to characterize the smallholder poultry production and marketing systems there by to identify the major constraints and priorities for poultry improvement and extension interventions. A structured questionnaire and Participatory Rural Appraisal (PRA) methods relevant to rural poultry production were used to collect data. Using a stratified random sampling technique, hundred and sixty households were included in the survey. The result showed that the main objectives of chicken production in the study area were for sale (44%), replacement (34%) and consumption (22%) and that of eggs used for hatching (47%), sale (33 %) and home consumption (20 %). The most dominant chicken production system in the study area was a subsistence extensive system which is based on indigenous chickens with scavenging and seasonal supplementary feeding of homegrown grains and household food refusals. The overall mean flock size for the three weredas was  $9.22 \pm 0.35$  with a range of 3 -26. Nearly all (97.6 %) of the respondents do not have a separate house to their chickens and only 10% of the respondents have access to veterinary services. Poultry production was managed based on indigenous or local knowledge they have acquired over their lifetime. The high hatchability (89.1 %) and mortality (80%) are the two conflicting feature of the system. Men and women took 35 % and 24.4% ownership respectively. The major decision role belongs to men. However, the major management was the responsibility of women. The overall average age at first egg was  $7.07 \pm 0.08$  ranging 5-10 months. The average egg production per clutch was  $14.9 \pm 0.23$  ranging (6-26) with a mean  $3.7 \pm 0.04$  clutches per year ranging 2-5 clutches with a clutch length of  $26.2 \pm 0.41$  days. The overall mean cock: hen ratio was 1:2.2. Chickens in Wonsho (Dega) wereda showed significantly ( $p < 0.05$ ) best performance with the highest egg production (62.95 eggs/hen/year), lowest chick mortality (45.15) and highest clutches per year (3.8) compared to other Weredas. The mean live-weights for matured male and female at farm Gate were  $1.58 \pm 0.02$  (kg) and  $1.30 \pm 0.02$  (kg), respectively. The corresponding price for matured male and female at farm gate were  $21.74 \pm 0.54$  and  $13.95 \pm 0.43$  birr, respectively in during ordinary days. More than half of the respondents (65%) do not have any information about the price of the chicken. Only 31.67% of the volumes of sale pass directly to the consumer. Critical constraints of the smallholder poultry production in the study area were partly due to the prevailing poor management practices, in particular predation, lack of proper health care, and poor housing. It was concluded that efforts have to be made to shift the production paradigm to semi intensive focusing on market oriented production based on scavenging with a holistic support of services such as health, housing, extension, credit and marketing to make it productive and sustainable.*

**Key words:** *Indigenous chickens, scavenging, chicken production and marketing systems, marketing channel.*

## 1. Introduction

In Ethiopia, the agricultural sector is a corner stone of the economic and social life of the people. The sector employs 80-85 percent of the population and contributes 40 percent to the total GDP (Zinash *et al.*, 2001). Livestock production, as one component of agriculture, covers 40 percent of agricultural output and it also plays an important role in the national economy as it contributes 13-16 percent of the total GDP (Abassa, 1995; Seifu, 2000). The diverse agro ecology and agronomic practice prevailing in the country together with the huge population of livestock in general and poultry in particular, could be a promising attribute to boost up the sector and increase its contribution to the total agricultural output as well as to improve the living standards of the poor livestock keepers. Poultry production, as one segment of livestock production, has a peculiar privilege to contribute to the sector. This is mainly due to their small size and fast reproduction compared to most other livestock and its well fitness with the concept of small-scale agricultural development. Moreover, it goes eco friendly and does not compete for scarce land resources.

There are varieties of chicken production systems because of the considerable differences that exist in the physical and socio-economic circumstances of rural community in developing countries (Kitalyi, 1996). Likewise, different names have been given to these chicken production sometimes used interchangeably. These includes: village, family, free range, scavenging, rural or traditional and smallholder chicken production (Cumming, R.B.1992; Tadelle and Ogle, 1996a; Kitalyi, A.J. 1996; Gueye, E.F. 2000a, Alemu, Y. 2003; Gausi, et al., 2004). For the purpose of this study, the term ‘smallholder chicken production’ used that

refers to the smallholder chicken raisers who normally raise chickens for semi subsistence purpose rather than on a full commercial scale.

Poultry farming is widely practiced in Africa almost every farmstead keeps some poultry mainly for consumption and cash sales. Religions and cultural considerations are also amongst the reasons for keeping chickens by resource poor farmers in Africa. (Dwinger *et al.*, 2003). Similarly, households in Ethiopia keep birds for household consumption, sale and reproduction purposes including other social and cultural roles (Tadelle and Peter, 2003). Estimating the economic value of rural poultry is more difficult than for other livestock because of the lack of reliable production data. However, the rural poultry in Africa believed to be a viable and promising alternative source of cash income for the rural resource poor women. In most of the cases, the earnings from the sale of eggs and chickens had spent in direct relation to nutrition, health and education of the family (Pederson *et al.*, 2001). Thus, in a country like Ethiopia that attempts to secure food at household level, any development actions that promote the smallholder chicken production system in one way or another helps to secure food at household level.

Poultry production systems of tropical regions are mainly based on the scavenging indigenous chickens found in virtually all villages and households in rural area. Approximately 80% of the chicken populations in Africa are reared in these systems (Gueye, 1998). With the exception of urban areas in northern and southern Africa, most poultry production in Africa is under taken through an extensive system at village or family level based on the scavenging domestic fowl (*Gallus domestics*) (Dwinger *et al.*, 2003). Poultry production system in Ethiopia is an indigenous and integral part of the farming system that ranges from nil input

traditional free ranges to modern production system using relatively advanced technology. However, the traditional system is predominantly prevailing in the country and it is characterized by small flock, minimal inputs, periodic devastation with short lifecycle, quick turn over and unorganized marketing system. (Tadelle and Ogle, 1996a; Alemu and Tadelle, 1997; Aberra, 2000; Solomon, 2004). The indigenous chickens predominately prevailing in this system are low in productivity due to various reasons. Despite their low productivity, the indigenous chickens are known to possess desirable characters such as thermo tolerant, resistant to some disease, good egg and meat flavor, hard eggshells high fertility and hatchability as well as high dressing percentage (Aberra, 2000). However, In spite of the above important desirable characters, the indigenous chickens have been neglected in areas of scientific research on its characterization, performance potential, and development efforts. In addition, rearing them has been considering as a sideline agriculture activity.

Although poultry is reared all around the world under very different circumstances, the main objective is always the same maximum production with as few costs as possible. However, only a little attempt made to promote markets and marketing issues. Experience indicated that the government agricultural extension services only pass on technologies with little or no reference to market and price. A recent study by Alemu *et al.* (2006) suggested that marketing problem is one of the constraints for the adoption of poultry technology and poultry products.

Generally, in order for decision-makers to address the poultry related challenges in production and marketing and to improve the livelihoods and food security of rural households by enhancing the benefits from poultry through appropriate production and marketing extension, it is essential to conduct a research that could generate appropriate technology, which is

socially acceptable, environmentally sound and economically feasible. Characterization of the prevailing production and marketing system is thus an obvious prime prerequisite to bring this into an effect.

Although there are studies conducted on characterization of poultry production system in some places of the country, the studies made so far were not comprehensive because some works did not include the marketing component and/or did not correlate production and productivity with marketing situation and some of them was site specific. In addition, many government and non-government projects have been dealing with exotic chickens without due consideration given to their compatibility to the socio-economic circumstances, the ownership pattern, control and access of resources, distribution of benefits and marketing. Therefore, comprehensive studies that run from production to marketing are worth understanding to provide full image of the overall systems.

This study was undertaken to characterize the smallholder poultry production and marketing system. Hoping that the findings of the study will be sound enough in addressing the problems of the Weredas' studied and it provides a base line data to complement the decision making process ultimately to improve future extension interventions. With this in mind, this research was conducted with the following general and specific objectives.

**General Objective**

- ✓ To characterize the poultry production and marketing systems of Dale, Wonsho and Loka Abaya weredas of SNNPRS.

**Specific Objectives**

- ✓ To assess the performance, socioeconomic function of chicken in the study area
- ✓ To investigate marketing channels and key players in the poultry marketing system
- ✓ To identify the major constraints and possible opportunities in the system

## 2. Literature review

### 2.1. Characterization of smallholder poultry production systems

Generally, there are four poultry production systems in developing countries and in Africa. These include the free-range system or traditional village system; the backyard or subsistence system; the semi intensive system and the small-scale intensive system (Bessei, 1987; Sonaiya, 1990a; Kitalyi, 1998; Branckaert and Gueye, 2000 and Gueye, 2000a). Some of the important characteristics of these poultry production systems in Africa are summarized in Table 1.

Table 1. The major characteristics of the chicken production system in Africa

Characteristics	Traditional free range	Backyard or Subsistence	Semi-intensive	Small scale intensive
Flock Size	1-10	10-50	50-200	50-500
Ownership	Women & children	Women & family	Middlemen	Business men
Breeds	Indigenous	Indig. & crossbreds	Cross breeds	Layers or broilers
Feed Source	Scavenging	Scavenging & supp	Commercial/local	Balanced diets
Health Status	No vaccination No medication	Vaccination & Little medication	Vaccination Little medication	Full vaccination Full medication
Housing	No specific housing	Simple and small houses	Medium & improved	Big and improved
Egg Production	30-50 eggs/yr/hen	50-150 eggs/yr/hen	80- 160eggs/yr/hen	250-300eggs/yr/hen
Use Patterns	Home consumption	H. consump & sale	Family income	Business income

Source: Sonaiya, E.B. 1990; Kitalyi, 1998; Sonaiya *et al.*, 1999; Gueye, 2003 and Riise *et al.*, 2004.

The most common production system found in Africa are the free-range and backyard production systems (Sonaiya, 1990a; Gueye, 2003) and approximately 80% of chicken populations in Africa are reared in these systems (Gueye, 1998). The chicken in this system are a function of natural selection. As a result the performance of chickens under rural conditions remain generally poor as evidenced by highly pronounced broodiness, slow growth rates, small body size and low production of meat and eggs (Kitalyi, 1998; Sonaiya, 2000).

Poultry production systems in Ethiopia show a clear distinction between traditional low input systems and modern production system using relatively advanced technology. There is also a third emerging small-scale intensive system as an urban and pier urban small-scale commercial system (Alemu and Tadelle, 1997). However, the smallholder rural poultry production that predominately exist in the country is characterized as including small flocks, nil or minimal inputs, with low output and periodic devastation of the flock by disease (Tadelle and Ogle, 1996a). The present situation in many villages is that poultry left with little or no care. This causes severe fall in productivity. The birds find their feed by scavenging around the houses in the village, and in addition, they might get leftovers from the harvest. As a result, feed is rarely adjusted to the needs of the birds. Young chicks are left scavenging together with adult birds having to compete for feed and becoming an easy prey for predators and spread of diseases. Very often birds do not get enough water, or they get dirty water, which may transfer diseases. Birds are also rarely put in an enclosure or shelter. Nests for hens are rarely provided causing the birds to lay their eggs on the ground even some times in the nearby bush. Furthermore, the system is usually based on hens with the ability to go broody and rear their own chicks. This has many advantages, but the long broody periods reduce egg

production (Hoyle, 1992; Alemu 1995; Alemu and Tadelles, 1997; Fikre. A., 2000; Tadelles and Ogle, 2001).

## 2.2. Importance of the small holder chicken production systems

Chicken production is an important agricultural activity of almost all rural communities in Africa, which makes the best use of locally available resource. Though neglected in the development themes for a long time, now a day's many researchers and development agents are becoming in to consensus that the smallholder chicken production play a major role in poverty alleviation and food security at household level. It provides off-farm employment and income generating opportunity and source of gifts and religious sacrifices (Wethli, 1995; Sonya, 1990a; Gueye, 2003; Tadelles and Ogle, 2001; Sonaiya, 2000). Scavenging chicken also serve in waste disposal system by converting leftover of grains and human foods and insects in to valuable protein foods-egg and meat (Doviet, 2005). The smallholder poultry production considered as an income-yielding activity that fits well with the concept of small-scale agricultural development. Moreover, land, which is a critical production resource in rural Ethiopia, is not a limiting factor in the smallholder chicken production systems.

Village chicken products are often the only source of animal protein for resource-poor households. Eggs are a source of high-quality protein for sick and malnourished children under the age of five. Due to their small size and fast reproduction compared to most other livestock, chicken are more often slaughtered and eaten in the household (Delgado *et al.*, 1998). However, according to Tadelles *et al.* (2003) only 32% of the animal protein needs of the household are supplied from poultry. Although the smallholder rural poultry production

plays a significant role in the national as well as in the rural and pier-urban economy, their contributions to farm household as well as national income are not as high as their number. The per capita chicken meat and egg consumption in the country reported to be 2.85 kg and 57 eggs per annum (Alemu and Tadelle, 1997) with the higher meat consumption in urban areas than in rural areas (Kena *et al.*, 2002). Therefore, providing the necessary support to the development of poultry production in rural areas is essential in order to increase the household income and food security (Wethli, 1995).

Future prospects for rearing village chickens believed to be promising as there is traditionally high demand for their meat and eggs that perceived to be flavorsome and of higher quality than that of exotic breeds (Crawford, 1992). By its numerical importance, rural poultry contributes to the protein supply of the human population. Thus, for its role in the supply of chicken and eggs and source of income for resource poor women, the smallholder rural poultry production in the country cannot be neglect.

## 2.3. Socio economic aspects of poultry production

### 2.3.1 Social and economic scenario

Nearly all rural families keep a small flock of poultry and rearing of poultry has practiced for many generations for different social and cultural reasons (Gueye, 2003). However, the most common purpose for keeping chickens and eggs were primarily as source of income and for hatching, respectively. According to the study conducted in the Central Highlands of Ethiopia by Tadelle *et al.* (2003), about 50, 27 and 23% of the egg produced are used for hatching, sale and home consumption, respectively. In another study conducted by Aberra (2007) in southern

parts of Ethiopia, about 71.4% of chickens raised by the rural community were used for egg production while the rest 28.6% were used for meat production purposes.

There are fewer religious or social taboos associated with poultry production than there are with pigs and cattle. Poultry keeping rather has a symbolic importance within the context of social cultural and religious function. For most of these social and cultural functions or sacrifices, a specific sex and plumage color of poultry are prescribed (Gueye, 2003). For instance, Tadelle and Ogle (2003) reported white and red cock sacrificed for the purposes of good harvest wishes and red and black spotted cock sacrificed for the purpose of Ethiopian New Year. In general, rural poultry plays a significant role in cultural and social life of rural people in the following ways: as gifts for relatives and for religious ceremonies, cock as alarm clock, to cure a sick person, starting capital to youth and for special guests' invitation. For instance, farmers in rural area invite special guests to partake of the popular dish "doro wat", which contains both chicken meat and eggs and (Sonya, 1990a; Sonaiya, 2000; Tadelle and Ogle, 2001).

The importance of rural poultry in national economies of developing countries and its role in improving the nutritional status and incomes of many smallholder farmers and landless communities has been recognized by various scholars and rural development agencies in the last two or three decades. However, rural poultry does not rate highly in the mainstream national economies because of the lack of measurable indicators of its contribution to macroeconomic indices such as gross domestic product (Roberts and Gunaratne, 1992; Dolberg, 2003 ;).

The total poultry egg and meat production in Ethiopia estimated to be about 78,000 and 72,300 metric tons, respectively. Per capita consumption of these products is also very low relative to the world and African standards (ILCA, 1993). In addition to their contribution of high quality animal protein and as a source of easy desirable income for farm households, rural poultry represent a significant part of the rural economy. This segment of production in Africa as a whole represents an asset value of US\$5.75 billion (Sonaiya, 1990a). Moreover, rural poultry integrate very well and in sustainable way into other farming activities, because they required little in the way of labor and initial investment as compared with other farm activities (Tadelle and Ogle, 1996a). A further advantage is that small area of land is required to keep chickens.

Findings confirmed that women owned most chicken flocks and that income generated from chicken production belongs to them (Pederson *et al.*, 2001). Seeberg (2002) also reported that 92% of the interviewed women kept the income from selling of eggs and chicken in their own hands and they sent more of their children, especially girls, to school. Experiences from Bangladesh showed that improved chicken productions increased farmer's livelihood and Women empowerment (Danida, 1998). The participation of women in rural poultry improvement programs contributes to human development both by increasing access for rural women to income and knowledge, and by increasing production efficiency (Aboul-Ella, 1992; Bradley, 1992).

For household poultry production to be economically sustainable, an enabling economic environment needs to be established. In order to provide an enabling environment for smallholder poultry production in communities, there should be sufficient institutional

capacity in both the public and private sector (NGO's) so that gender based extension interventions that could address rural resource poor women and children, and appropriate technology could be administer (Bradley, 1992). Evaluation reports from a number of integrated development projects in developing countries also indicate that scavenging village chickens play a significant role in poverty alleviation and enhancing gender equity among the disadvantaged communities (Saleque, 1996).

### 2.3.2. Decision making on and ownership of chickens

The pattern of ownership differs to some extent according to sex and age of the owner; hence, the ownership of chickens shared among all gender categories. No data are available at national level. However, some studies showed that women have a more active interest in poultry ownership than men do. According to the survey made in Welaita (Hoyle, 1992), senior men and senior women have the highest flock ownership accounting to 30% and 47%, respectively when compared to the other gender groups boys and girls. Usually ownership affects decision-making and management of the chickens. The management of rural chicken in Africa is a family affair with construction of chicken house and major decisions making issues such as sale of chicken and eggs and consumption of poultry products under the control of the men. Whereas looking after chicken, controlling and utilizing the earnings from the sale of eggs and chicken belongs to women (Gueye, 2003). Similarly, Tadelle and Ogle (2001) indicated that in Ethiopia management of chickens was fully in the domain of women whereas decision making regarding control and access to resources varies considerably. Kitalyi (1998) showed that in Gambia, there was gender plurality in decision-making in village chickens

production. The same source indicated that in the United Republic of Tanzania men dominated in both selling and buying chickens in village markets.

## 2.4. Scenario of small holder poultry production management and marketing systems

### 2.4.1. Feeding

Family poultry production in Africa survives by scavenging and generally, no supplements provided except that some times, household waste fed to the birds and other circumstances the diet supplemented with grain (Dwinger *et al.*, 2003). Similarly, in Ethiopia the smallholder chicken production system is characterized by keeping under free range system and the major feed sources are believed to be insect worms, seed and plant materials (Tadelle and Ogle, 1996a; Solomon, 2004).

One of the major production constraints to the development and growth of the rural family poultry in most developing countries is the estimation of feed intake and feed utilization under scavenging conditions. Such data will provide the basis for improvement in feeding management, in terms of supplementary feeding and stocking density or birds per unit scavenging area (Gunaratne *et al.*, 1993). However, the crop analysis result indicated that the physical proportion of seeds was higher in the short rainy season and the concentration of crude protein; calcium and P were below the recommended requirements for egg production and the diet are also unbalanced (Tegene, 1992; Tadelle and Ogle, 1996b; Alemu and Tadelle,

1997). This limited resource feed restricts the potential productivity of local birds to 40-60 eggs per hen per year. Both egg production and egg size vary with season, as the quality and availability of feed varies (Mbugua, 1990). According to the finding of Tadelle and Ogle (1996b), the feed resource is deficient in protein, energy and probably calcium for layer birds, and this is confirmed from the results of supplementation trial, which show that supplementation of local birds with feed sources containing energy, protein and a calcium source brings a considerable increase in egg production.

#### 2.4.2. Housing

Although no data are available about housing at national level, the local birds are set free on free range whereby they move freely during the day and spend the night in the main house. Overnight housing, perched in trees or on roofs and overnight housing within the main house are the common patterns of housing prevailing in the country.

Lack of housing is one of the constraints of the smallholder poultry production systems. In some African countries, a large proportion of village poultry mortality accounted due to nocturnal predators because of lack of proper housing (Dwinger, *et al.*, 2003). Some research works also indicated that the mortality of scavenging birds reduced by improved housing. For instance, in the Gambia livestock improvement program, which included improved poultry housing resulted in lower chick mortality (19%) relative to that observed in Ethiopia (66%) and Tanzania (33%), where no housing improvements were made (Kitalyi, 1998).

### 2.4.3. Disease and predators

The indigenous flocks are said to be disease resistant and adapted to their environment. However, the survival rates of the Ethiopian indigenous chicks kept under natural brooding conditions considered low. Disease and predators are known to be the major causes of mortality in the country (Holye, 1992; Negussie, 1999). According to Negussie and Ogle (1997), New castle disease accounted for the largest proportion of overall flock mortality to be 57.3% followed by fowl pox 31.6%, coccidiosis 9.4% and predator loss 1.7%. Another study conducted in all zones found in Southern Ethiopia by Aberra (2007) indicated that the major problems of poultry production in the study areas were Fowl cholera (28.8%), followed by New Castle Disease (26%), Coccidiosis (21.6%), Fowl influenza [Infectious Bronchitis] (15.4%), Fowl pox (3.4%), Fowl typhoid (3.4%) and Salmonella (1.4%). The prevalence of fowl cholera was considerably higher in the mid-altitude (53.3%) while fowl typhoid was a major problem in low altitudes accounting for 57% of the overall mortality. Predators such as snakes, rats, dogs, cats and foxes are the main causes of losses especially in young birds. Thefts are also another important cause for the loss of adult birds. According to Aberra (2007), about 46% of the respondents in Southern Ethiopia reported, that wild birds (eagle, hawk, etc.) are the most common predators during the dry season, while wild cat (locally known as Shelemetmat) is the most dangerous predator during the rainy season.

### 2.4.4. Marketing

Poultry marketing structure has not well studied in Ethiopia. The market outlets or channels available to producers are diverse at all markets, although their importance differs across markets. The major channels through which producers/farmers sell their chicken in the

markets are direct sold to consumers and/or to small retailers that take the chicken to large urban centers (Kena *et al.*, 2002). However, the smallholder farmers do have little knowledge on how the market works and why price fluctuates and have virtually no information on market conditions (Sonaiya, 2000). Thus, most farmers sell chickens within their vicinity. This can attribute to the small number of chickens offered for sale, long distance to the high demanding urban and peri urban markets and that selling of chickens is occasional and based on prevalent pressing needs of the family (Kena *et al.*, 2002). Although local consumers generally prefer the indigenous birds the high consumption associated only with holy days resulted in the largest off take rates from the flock to occur particularly during holidays and festivals and during the onset of disease outbreaks (Tadelle and Peter, 2003). In such circumstances, prices fall dramatically due to the high supply compared to demand. Ultimately, affect the smallholder producers.

In most cases, traders use public transportation (buses and minibuses) or hire space in private trucks to transport chicken to terminal markets. During transportation, the chickens may be kept along with other bags sacks of grain bundles of firewood etc by binding their legs together that can result in considerable loss due to stressful conditions (Kena, 2002). The marketing aspects of the smallholder poultry production often marginalized by policy-makers and development workers. Traditional chicken and egg collectors, who collect eggs and birds from the villages, can facilitate the marketing of small holders however, such marketing structure are overlooked, or criticized, as it is not sustainable. These indicate that there is a need to do something on this regards.

## 2.5. Extension interventions

Improvements of the genetic potential of the local chicken have done through selection within and/or up grading with exotic breeds. Thus, for the last four decades, scientists and government have promoted schemes in which exchange of cockerels from selected strain or breed could improve the performance of local chickens. The intention of this scheme was to enable farmers to handle pure breeds as well as crossbreed chicken. Unfortunately, no systematic effort was made to evaluate performance of this scheme Moreover; they were not compatible with the socio-economic circumstances in the village chicken production system. This is mainly because ownership pattern, control and access of resources, distribution of benefits and marketing are issues that have not been adequately addressed in the process of interventions (Sonaiya, 1990a).

Over the last decades, government extension has been exercising to disseminate dominantly white leghorn and RIR as a poultry extension package to improve both production and productivity of local chickens. However, experience indicated that the poultry extension packages launched by the government are not properly evaluated. Lack of recorded data on the performance of chickens and in all aspect of managements makes difficult to assess the importance and contributions of the past attempt to the sector. Moreover, lack of routine or regular village chicken health program, poor infrastructure and marketing formations are some of the problems associated with the extension intervention efforts made so far.

## 2.6. Constraints

### 2.6.1. Inadequate health care and poor feed source

The major problem impairing the existing production system in Ethiopia is the high incidence of Newcastle disease, which named locally "fengel" (Holye, 1992; Alemu and Tadelles, 1997; Solomon 2004). Another report in Southern parts of the country by Aberra (2007) indicated that fowl cholera is a major problem followed by Newcastle disease. Next to disease, the major limiting factor of production increase is lack of feed. The nutritional status of local laying hens from chemical analysis of crop contents indicated that protein was below the requirement for optimum egg production the deficiency is more series during the short rainy season and dry seasons (Tegene, 1992; Alemu and Tadelles, 1997).

### 2.6.2. Inadequate emphasis to research and extension

Until recently, little emphasis has given to livestock and poultry research. The extension linkage between the research output and the ministry of agriculture and the farmers are found to be extremely weak (Alemu and Tadelles, 1997) and in general there is no consistent feedback to the research. Most of the poultry extension workers transfer their extension packages to the households expecting that the husband will pass the message to his wife (Fikre, 2000). However, poultry keeping in most parts of Ethiopia is mainly the responsibility of women as reported by Tadelles and Ogle (1996a). This indicated that there are no client-oriented extensions.

### 2.6.3. Lack of organized market and poor access to main market

Even though chicken meat is relatively cheap and affordable source of animal protein (Alemu and Tadelle, 1997), lack of organized marketing system and the seasonal fluctuation of price are the main constraints of the poultry market in Ethiopia. Variation in price mainly attributed to high demand for chickens for Ethiopian New Year and holidays. It also partly influenced by weight, age of chickens and availability. The plumage color, sex, combs types, feather covers are also very important for influencing price.

According to Gausi *et al.* (2004) the major constraints in rural chicken marketing were identified as low price, low marketable output and long distance to reliable markets. As a result, the smallholder farmers are not in a position to get the expected return from the sale of chickens. Likewise, poor marketing information system, poor access to terminal market, high price fluctuation and exchange based on plumage color, age and sex are among the main constraints of chicken market in the country (Kena, 2002).

### 2.6.4. Social and cultural constraints.

The socio cultural constraints to poultry development are the value placed up on poultry for use at ceremonies and festivals or even as source of income in times of need but neither as source of daily food nor as regular source of income. Some regard chickens as their pets or part of the family, thus rarely used as food for home consumption, although they can sold without regret and the money utilized.

Another constraint is the social norm that determines owner ship of livestock. Typically, where crop farming is the men's main activity, keeping livestock is perceived as a peripheral

activity neglected to women and children. Practical experience indicates that there were no regular watering and supplementing feed and they do not clean the birds' night shelter and take care of the young chicks. Farmers are also reluctant to expand their poultry farm. The farmers attitude to the sector makes the rural traditional poultry farming remain unchanged for a long time.

### 3. Materials and methods

#### 3.1. Description of the study area

The study was conducted in the former Dale wereda. Recently, after the proposal of this research was approved, the former Dale wereda divided in to three distinct weredas namely Wonsho, Loka Abaya and Dale. Dega represented by Wonsho and Woinadega and kola are represented by Dale and Loka Abaya weredas, respectively. The former Dale wereda (Fig 1) which consists the three weredas lies 6045'N and 38031'E, and is located 320 Km south of Addis Ababa. Dale Wereda is one of the ten Weredas found in Sidama zone of Southern Nation Nationalities and Peoples Regional States (SNNPRS). It has a total area of 1,411 km<sup>2</sup> and is the biggest Wereda in Sidama zone which is subdivided into 76 kebeles, of which 36, 17 and 24 kebeles belong to Dale, Wonsho and Loka Abaya weredas, respectively. The population of the three weredas is estimated at 369,548, of which women accounted for 57.6% (CSA, 2003). The altitude of the Wereda ranges from 1170 - 3200 masl. The annual temperature is 20<sup>0</sup>C, while the annual rainfall is 1250 mm. The area is classified in to three agro ecological zones consisting 6.6% Dega 40.6 % Woinadega and 53.36% of Kola (IPMS, 2005).

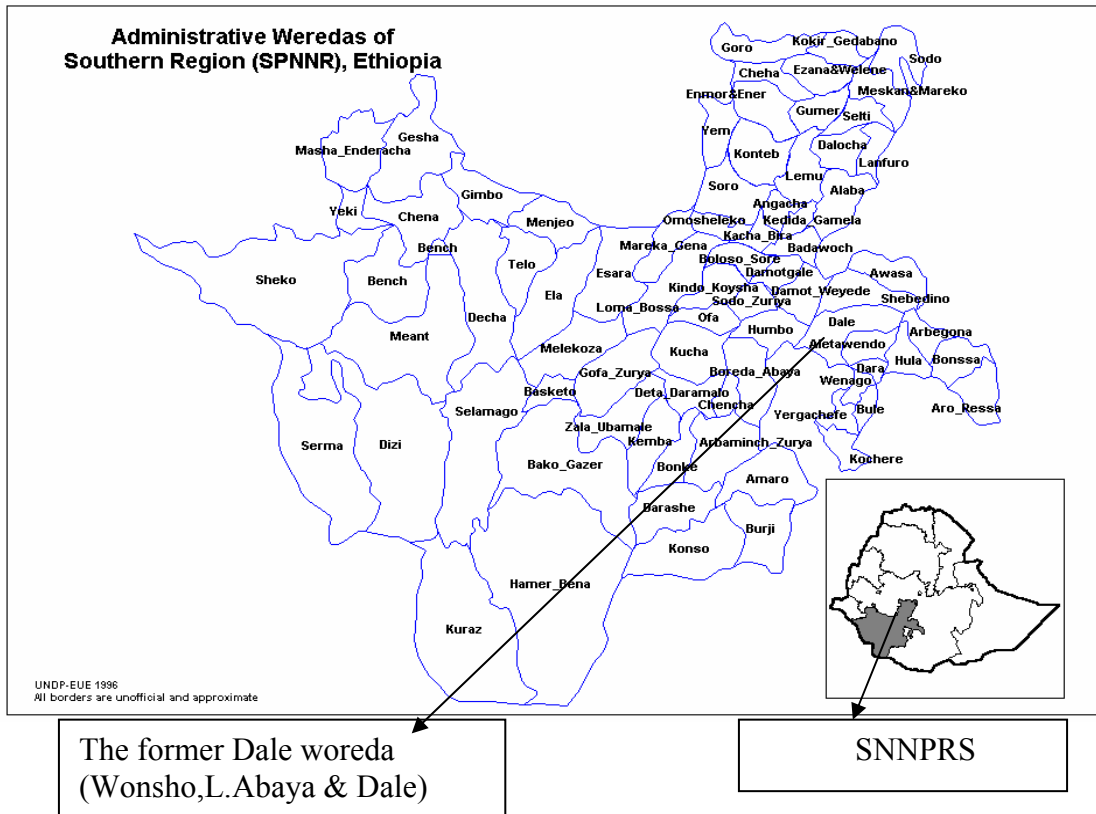


Figure 1. Administrative weredas of Southern Nations, Nationalities and Peoples Region States (SNNPRS) indicating the former Dale woreda or the study area.

Livestock plays a major role in crop production areas of the mid highlands and lowlands for cereal production (draught power) in addition to meat, milk and prestige. The livestock resources of the Weredas are 166,142 cattle, 19,492 sheep, 17,284 goats, 205,397 poultry and 10,716 beehives (CSA, 2003). Coffee, chat, enset, cereals and pulses are the important crops of the area.

## 3.2. Sampling method and data collection

### 3.2.1. Sampling

A stratified random sampling technique was used to stratify the agro-ecological zone (Dega, Woinadega, and Kola). Wonsho represented Dega agro-ecological while Dale and Loka Abaya represented Woinadega and Kola agro ecologies, respectively. The numbers of kebeles surveyed were randomly selected from each stratum or wereda proportional to the size of the wereda. Thus, 2 kebeles from Loka Abya and Wonsho, respectively and 4 kebeles from Dale wereda were randomly selected making a total of 8 kebeles (Table 2). From each randomly selected kebeles, 20 households that possessed five or more chickens were randomly considered for the survey study. Thus, 160 households were included in the survey. For marketing survey a random sampling technique was employed thus a randomly selected sellers, buyers and middlemen were interviewed from each selected market places (Table 2).

### 3.2.2. Data collection

A structured questionnaire integrated with Participatory Rural Appraisal (PRA) method relevant to rural poultry production (ranking, key informant and group discussion, transect walking) were used in the data collection. For the analysis of livestock in terms of Tropical Livestock Unit (TLU), animals of different sizes and species were converted into tropical livestock units (TLU), commonly taken to be an animal of 250 kg in live weight see the conversion standard (Appendix II). To measure chicken weight a handy field balance of 5 Kg measuring scale was used.

Table 2 Sampled wereda, kebeles and market places from each agro climatic zone for both production and marketing data collection.

Climatic condition	For production data		For marketing data	
	Wereda	Kebeles	Households	
			Place of market	
Dega (>2500 masl)	Wonsho	Menafesha	20	Wonsho market
		Lalamo	20	
Woinadega (1500-2500 masl)	Dale	Mesencho	20	Arada, Sidetenga and Aposto market
		Motto	20	
		Awada	20	
		Tula	20	
Kola (<1500 masl)	Loka	Dayado	20	Hantate market
	Abaya	Adegale	20	
Total sample size			160	

Information was collected from individual farmer, extension officer, key informant and village group using both methods. The exercises was aimed at assessing the perspectives of the poultry production system including intra household dynamics (division of labor, access to and control over of resources and decision making on resources), the functions and importance of chickens in the socio-economic live of the community such as cultural roles, traditional rites in the respective study areas.

Information on indigenous and exotic breeds of poultry including; flock characteristics and ownership, the perspectives of functional traits and flock performance, use pattern, off take and loss of chicken and all aspects of chicken managements were collected.

Finally, closer visits in and around the residential quarters of the villages were made in order to obtain first hand observation on different aspects of poultry production from individual households and to involve women in the households since their participation in the village meetings and other data collection activities is expected to be rather restricted.

A separate structured questionnaire was developed to address poultry and poultry product marketing. Accordingly, a longitudinal data collection (repeated survey) and a participatory marketing appraisal technique were employed 2132 chickens from the open markets were weighed and their price and colors were recorded weekly in each market for six months and two holiday markets. Data on marketing chains and channels (where to, whom and how many they sell?) were collected. Finally, a visit to physical facility of the market and open discussion with farmers, intermediaries, buyers, and seller were made.

### 3.3. Statistical analysis

Qualitative and quantitative data sets were analyzed using appropriate statistical analysis procedures. Statistical Package for Social Sciences (SPSS, 1996 Ver. 13) was used for the analysis. To make comparisons among different groups ANOVA hypothesis testing procedures were employed and descriptive and inferential statistical procedures were employed. ANOVA model statement used to investigate the effects of Wereda difference on household characteristics (family size, farmland holding and chicken flock size per household) and various performance related parameters of chickens (age at first egg, number of clutches per year, clutch length, eggs/hen/year and inter clutch)

**Statistical Model**

$$Y_{ij} = \mu + A_i + \epsilon_{ij}$$

Where

$Y_{ij}$  = the value of the respective variable mentioned above pertaining to the  $i^{\text{th}}$  wereda ( $i=3$ , Wonsho, Dale, or Loka Abaya)

$\mu$  = overall mean of the respective variable

$A_i$  = the effect of  $i^{\text{th}}$  wereda ( $i=3$ , Wonsho, Dale, or Loka Abaya) on the respective variable

$\epsilon_{ij}$  = random error term

The mean separation were made using Tukey test. Tables and figures were used to present summary statistics such as mean, standard errors and percentages.

## 4. Results and discussion

### 4.1. Farming system

In the studied villages, farmers follow extensive mixed farming system rearing of livestock and crop production. The major crops grown in the surveyed area include enset (*Ensete ventricosum*), maize (*Zea mays*), coffee (*Coffea arabica*) and haricot bean. However, there is considerable variation in abundance and importance of crops across the three weredas. Enset, coffee and maize were rated as important crops in Dale (Woinadega) and Wonsho (Dega). While maize, enset, haricot beans and coffee were the major crops in Loka Abaya (Kola) wereda, listed in order of their importance. The live stock ownership and distribution of livestock species of the three Weredas as per the interview result are presented in Appendix I.

There are two cropping seasons in the area the short rainy season (Belg) from March to April and long rainy season (Meher) from June to September. The Belg rains are mainly used for land preparation and planting long cycle crops such as maize and seedbed preparation for Meher crops. The Meher rains are used for planting cereal crops like barley, teff, wheat and vegetable crops.

### 4.2. House hold characteristics

Household size and age structure of the study households' is presented in Table 3. The overall mean family size of sample households was 6.95 and ranged from 2-18 persons. This value was higher than the national average 5.2 persons and that of SNNPRS 5.1 persons per household (CSA, 2003). Average family size of Wonsho, Dale and Loka Abaya weredas were

7.6, 6.84 and 6.5 persons, respectively and did not differ significantly. This finding was more or less similar to the report of (Asefa, 2007) for the adjacent wereda Awassa Zuria that was reported as 7.0 persons per household. The age composition of households typically resembled population pyramid in most developing countries, with the majority of households' members being children under 14 years of age. Similarly, in the study area children (<15) accounted for 47.8% while that of youth male and female (age class of 16-30) accounted for 19.4% of the total household size. Husband, wife and other members of the family above 30 years old covered the remaining proportions. In the study village, the households' age group (16-30) covers 19.4%, showing that the productive labor necessary for care, marketing and management of chicken production was dominant in the family.

Table 3. Family, farm and chicken size of the surveyed Weredas

Location	N	Family Size	Farm size in ha	chicken per HH
		Mean $\pm$ SE	Mean $\pm$ SE	Mean $\pm$ SE
Wonsho	40	7.63 $\pm$ 0.49 <sup>a</sup>	0.88 $\pm$ 0.58 <sup>a</sup>	6.20 $\pm$ 0.21 <sup>a</sup>
Dale	80	6.84 $\pm$ 0.25 <sup>a</sup>	0.89 $\pm$ 0.61 <sup>a</sup>	9.89 $\pm$ 0.48 <sup>b</sup>
Loka Abaya	40	6.50 $\pm$ 0.37 <sup>a</sup>	0.77 $\pm$ 0.62 <sup>a</sup>	10.90 $\pm$ 0.83 <sup>b</sup>
<b>F</b> <sub>0.05</sub>		2.16	0.56	15.13
Overall Mean	160	6.95 $\pm$ 0.20	.86 $\pm$ 0.60	9.22 $\pm$ 0.35

<sup>a-c</sup> Means within a column with different superscript differ significantly (P<0.05)

Land holdings are very small and fragmented. The average farmland holdings was 0.86 ha ranged from 0.13 to 3 hectares (Table 3) However, 52.4 % of the farm families have a

farmland below one hectare. The average number of chicken holdings per household in Wonsho was 6.2 (Table 3), which is significantly ( $p < 0.05$ ) lower than the average chicken size per household observed in Dale (9.8) and Loka Abaya (10.9).

The average livestock ownership per HH in terms of tropical livestock units (TLU) of the three weredas are presented in Table 4 (See Appendix I). The average chicken holding (TLU) per household was 0.092. Though chicken has small (TLU) compared to cattle, sheep, goat and donkey, they account the larger proportion in terms of their number.

Table 4. Total live stock ownership in TLU per household of the three weredas

Live stock in TLU per HH				
Types of Livestock	Wonsho (40)	Dale (80)	Loka Abaya (40)	Average TLU per HH (160)
cattle	2.90	3.00	3.52	3.12
Sheep	0.11	0.07	0.99	0.09
Goat	0.053	0.02	0.14	0.06
Donkey	0.03	0.08	0.11	0.07
Chickens	0.06	0.1	0.11	0.09

\* The sum of HH that owned any of livestock under cattle category.

Numbers in brackets indicate total number of respondents

### 4.3. Respondent's profile

General characteristics of the respondents presented in Table 5 About 13.8% of the interviewed farmers were female, while 86.2 % were male. However, the proportion of males (49.5%) was nearly equal with the females (50.5%) when the total number of household members was taken into account. The overall mean age of respondents was 51.4 and about 55.6% of the respondents found in the age group of 20 -60 years and 67.5% of the respondents have more than 10 years experience in poultry rearing. Concerning the educational background of the interviewed farmers, about 6.9 % were illiterate. Among the literate members, 28.1 %, 44.2 % and 14.7% and 12.7 % had gone through primary first cycle (1-4), primary second cycle (5-8), high school (9-10) and above secondary school, respectively

Table 5. Respondents' profile

Respondent profile	Number of respondents	Percent respondents
<b>Age of respondents</b>		
<20 Years	1	0.6
21-30	46	28.8
31-40	52	32.5
41-50	37	23.1
51-60	20	12.5
>60	4	2.5
<b>Gender</b>		
Male	138	86.3
Female	22	13.8
<b>Educational level</b>		
Literate		
1-4	42	28.1
5-8	66	44.2
9-10	22	14.7
>10	19	12.7

#### 4.4. Flock structure and characteristics

Flock structure is described in terms of the number and proportion of the different age groups and sex in a flock. The mean values of chickens in different age category and proportion of the respondent owning different size of chickens are shown on Table 6. The overall mean flock size per household was 9.2 and ranged from 5 -26. The value reported in this work is higher than 7-10 chickens per household reported by Tadelle and Ogle (1996) for the central high lands of Ethiopia and 8.8 chickens per household reported by Asefa (2007) for Awassa Zuria. It is also higher than 5-10 birds per household reported for Africa by Sonaiya (1990). Nevertheless, the value in this report was lower than Eugene *et al.* (2004) of Philippines, Ssewanyana *et al.* (2004) of Uganda, and Khalafalla *et al.* ( 2000) of Sudan who reported the mean flock sizes of 19, 18 and 22, for village chicken production system, respectively. Flock size variation in rural areas has been attributing to the farming systems practiced and local factors such as diseases and predators (Kuit *et al.*, 1986). However, the relatively higher mean flock size and range in the study area compared to other similar research conducted in the country is perhaps due to purposive selection of sampled farmers raising five and above chickens.

The numbers of chickens in the household in different age category vary considerably (Table 6). Highest mean number of chicks per household (4.9) was observed followed by hens (3.1). According to Asefa (2007) a report from Awassa Zuria wereda, the corresponding figures for chicks and hen were 3.8 and 2.5, respectively.

Table 6. Flock size and proportion of the respondent owning different size of chicken

Poultry category	Chicken per	Proportion of respondent owning				
	HH	Chickens (%)				
	Mean(SD)	1*	2*	(3-5)*	(6-10)*	>11*
Hen	3.11(1.26)	7.6	26.6	62.1	3.9	-
Pullets	2.35(1.33)	31.2	30.3	34.9	3.7	-
Cock	1.63(0.95)	59.1	27.0	13.9	-	-
Cockerels	2.15(1.29)	37.5	31.9	27.8	2.8	-
Chicks	4.91(3.13)	10.0	11.3	45.5	28.9	3.9

\* Size of chickens

In a study conducted in the central highlands of Ethiopia by Tadelle and Ogle (1996) reported 4.5 and 2.9 for chicks and layers per household, respectively. Compared to other African countries, the value in this report is greater than that of Gambia for chicks (3.9) and hen (2.2) reported by Rushton (1996) and lower than Oakeley (1998) who reported 8 chicks and 4–5 hens per HH for Zimbabwe.

Considering the proportion of chicken in the surveyed household, the proportional distribution of chickens in different age category varies considerably (Figure 2).

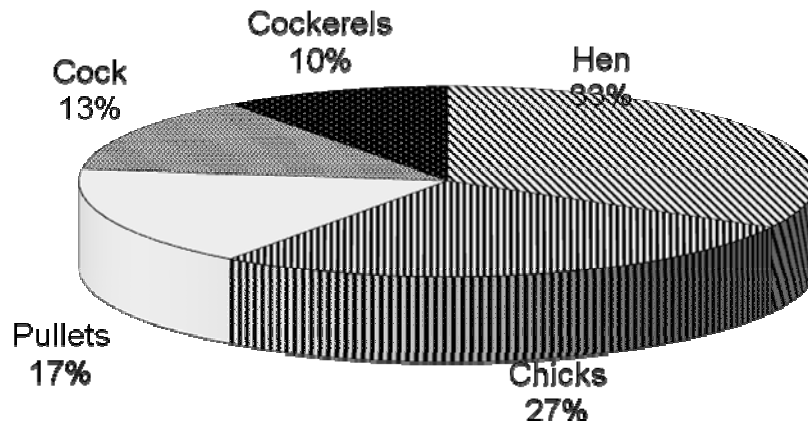


Figure 2. Proportions of chickens in the surveyed households

There were a high proportion of hens which accounted for 33.1% (Figure 2) and about 62.5 % of the respondent owned 3-5 hens (Table 6). In any poultry set up, the proportion of hens in the flocks is an indication of egg and chick production (Wilson *et al.*, 1987; Abdou *et al.*, 1992). The relatively large proportion of hens per HH in the surveyed area is purposively done by the farmers' aiming at warranting the next generation of the flocks (as 75.6% of the replacement stock obtained from chicks hatched in the house) and collecting adequate number of eggs for sale and household consumptions. The number of pullets and cockerels per household were similar having 2.4 and 2.2, respectively. However, the proportions of pullets were greater than cockerels and accounted for 17% and 10%, respectively (Figure 2). About

34.9% and 27.8% of the respondent owned 3-5 pullets and cockerels, respectively (Table 6). The comparatively more number of pullets per household could be a copping mechanism to replace the number of chickens reduced by selling, consumption and loss due to various reasons. Both the number and proportions of cocks per household was lower which accounted for 1.6 and 12.7 %, respectively about 59.1% of the respondents own only one cock. Farmers in the study area have the experience to remove males from the flocks at an early age for sale and sometimes for consumption. During group discussion, they have also mentioned that they remove males to minimize cock fighting and to maintain the male to female ratio.

The male to female ratio of 1:2.2 in this study is similar to 1:2.5 ratio reported by Alemu *et al.* (2003) for the research conducted in the country and 1:2 ratio reported by Kitanyi (1997) for developing countries. Moreover, the male to female ratio found in this study is within the range reported in free range and back yard chicken production systems for Africa 1:1-1:8 (Gueye, 2003).

The color of the local ecotype chickens found in the study area includes pure colors of black, white, red, grey (Gebsema) and mixtures of different colors including (red with black spot, white with black spot etc.). According to a transect walk conducted in the study area and a discussion made with key informants, all birds irrespective of age and sex have seen to move freely forming a sub-groups in and around the compound of households. Consequently, the cocks and hens mate indiscriminately. Aggressive and dominant cock in the neighborhood tends to be sire.

#### 4.5. Loss and off take

Predators, disease and theft accounted for 71%, 28% and 1 % of the loss from the flock, respectively (Figure 3). Moreover, about 76.3% and 23.8% of the off take from the flock was attributed to sales and consumption, respectively (Figure 3) indicating the fact that the primary purpose rearing of chicken is for sale.

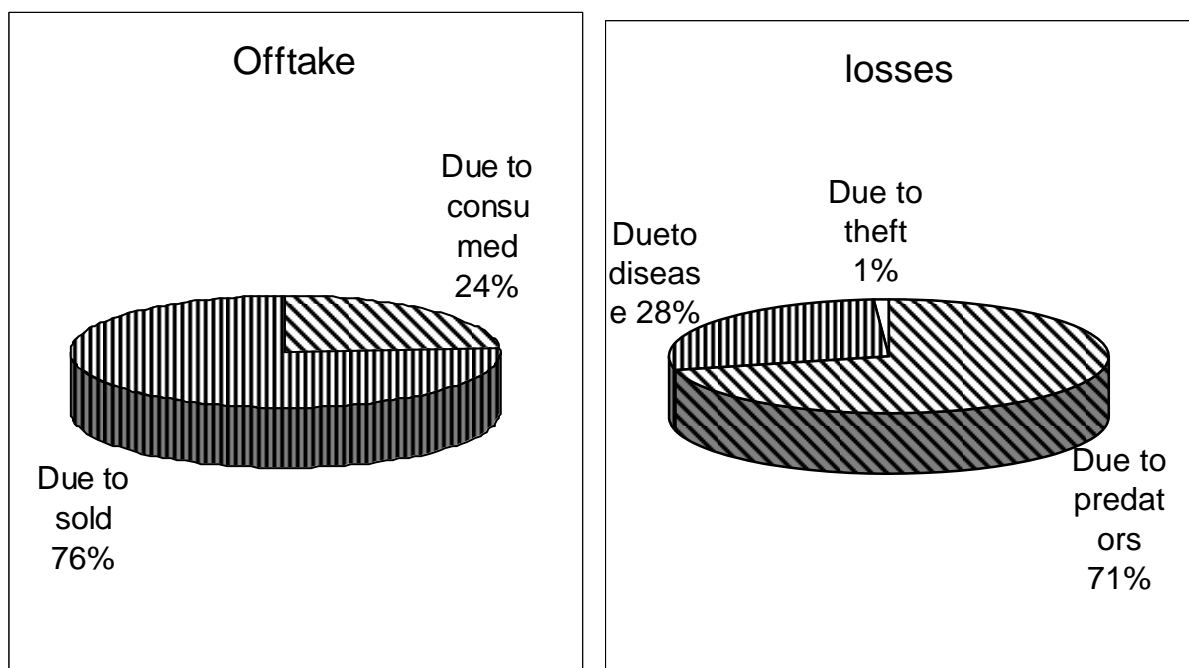


Figure 3. Off take and losses of chickens from the flock

#### 4.6. Chicken production system

The most dominant chicken production systems in the study area were the back yard or subsistence extensive systems that are based on the local indigenous chickens and scavenging with occasional and seasonal supplementary feeding of homegrown grains and household food refusals. About 95% of the farmers in the surveyed area owned indigenous chicken (local chicken eco types). None of the respondent farmers had owned exotic breed chickens alone, only 8 households (5%) were found to have both local and exotic breeds, especially Rhode Island Red in their flock. About 97.5% of the respondent obtained the initial stocks from the local market. The majority of the replacement stock (75.5%) constituted from chicken hatched in the houses and 22.2 % of the replacement stock bought from the local market.

The most important reasons for keeping chickens and producing eggs were primarily as source of income and for hatching, respectively. Men took the major ownership and decision on the chickens in the house. However, the major management activities pertinent to poultry production are the responsibility of women.

There were no specific separate poultry houses; overnight shelter with simple chicken nest made of carton or local basket and perch confined within the main house were the most commonly used housing facilities. The back yard chicken production system in the study area also characterized by high chick mortality caused by predators, and disease. The birds find their feed by scavenging among the houses in the village, and in addition, they might get leftovers from the harvest and from the kitchen with some supplements of homegrown grains.

The free-range feeding practice in the study area also attributed to indiscriminate mating of cocks and hens. None of the farmers followed regular vaccination and de worming for their chicken. Very often birds do not get enough water, or they get dirty water, which may transfer diseases.

Except for the little effort made to distribute some exotic breeds as part of the extension package under went in the weredas, there were no extension support attached to management, veterinary and marketing extension services. Traditionally, households make use of their own local/indigenous poultry rearing knowledge acquired over a long period. None of the respondents had formal training on poultry husbandry. However, about 73.6% of the respondents indicated that they require training in poultry husbandry.

#### 4.7. Socio economic and intra household dynamics

##### 4.7.1. Socio economic aspects of chicken production

There were no taboos on production and consumption of both chickens and eggs in the study areas. Thus, the mean consumption of chickens and eggs per household per year was 5.9 and 55.3, respectively. The main objectives of chicken production were for sale (44%) followed by replacement and consumption which accounted for 34% and 22 %, respectively (Table 7). This indicated that the extensive backyard poultry production in the study area is mainly used to generate cash. Eggs are often used for incubation (47%) aiming at replacing the off take and loss of chicken from the flock. This finding is close to Alemu *et al.* (2003) and Tadelle and Peter (2003) in the study of village chicken production system in Ethiopia who reported

that about 50% and 51.8% of the eggs produced are incubated in order to replace the new stock, respectively.

Table 7 Purpose of chicken and egg production

	Mean $\pm$ SE (%)	Range (%)
<b>Egg</b>		
Hatching	46.59 $\pm$ 14.84	10 - 100
Selling	32.83 $\pm$ 16.56	5 - 80
Home consumption	20.12 $\pm$ 15.69	5 - 75
<b>Chickens</b>		
Sale	43.67 $\pm$ 18.12	10 - 80
Replacement	33.86 $\pm$ 16.80	10 - 88
Consumption	22.09 $\pm$ 13.50	5 - 90

Concerning the expense in relation to poultry production about (12.5%) of the respondents spend their money on purchase of foundation stock, 23% for purchase of feed, 33% for purchase of both birds and feeds and the remaining 31.5% portion of the respondent spend their money for medication. However, the source of money for all these expense was personal income. On the other hand, nearly all interviewed farmers want to improve their poultry production status through improving feed and housing. However, the survey result revealed that there was no credit access especially designed for chicken production in all the surveyed

were das. This indicates that there is a big gap concerning the interest of the farmers to boost their production up and lack of access to credit and other extension services.

The contribution of poultry and their products to the household cash income are generally difficult to assess. Nevertheless, many economic researches in developing country indicated that this sector as a viable and promising alternative source of income for rural households (Oh, 1990). The same is true for the study area where an estimated average annual earnings from the sales of chicken was birr 123.9 (n=157) with a range of 20-300 birr (1US=9.30) per year. 72 % of the respondent spend the earnings from the sale of chicken to purchase of items for home consumption (to buy food for their families), 23% spend for educational materials (books, pen, pencils, uniforms and an immediate cash inquires from the school) and 4.4% of the respondents spend to purchase clothes and agricultural inputs.(Table 8).

Table 8. Expenditure of the income from sale of chickens

Expenditure	Percent	
	No of respondents	respondents
Educational Inputs	33	23.6 %
Agricultural Inputs	6	4.4%
Consumption items	100	72%

This indicates that chickens support food security at household level through not only direct consumption, but also creating an enabling economic environment that enables farmers to

have better purchasing power or better access to purchase food. It also has a financial support for schooling of children.

#### 4.7.2. Intra-household dynamics and labor profile

The intra-household dynamics refers to the way in which family members within the household behave and react to each other in managing the chickens they raise. These include ownership, decision-making, division of labor etc. The ownership pattern in the study area has shown in Figure 4.

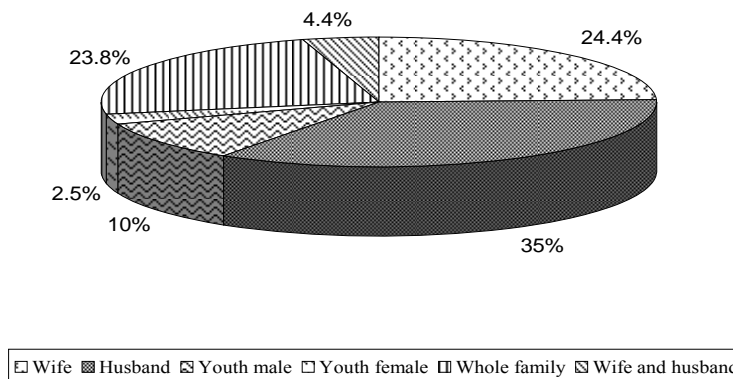


Figure 4. Chicken ownership distribution among different gender groups in the study households

Accordingly, men and women had 35 and 24.4% ownership, respectively. The remaining ownership was distributed to youth male and female, family and wife and husband, which accounted for 12.5, 23.8, and 4.4% ownership, respectively. This is more or less similar with

Hoyle (1992) who reported elder men and women accounted for 30% and 47% ownership, respectively in Welaita area. However, it was contrasting to findings of Tadelle *et al.* (2003) in the central highlands of Ethiopia which reported as women owned and manage birds and controlled the cash generated from the sale of birds. The ownership of village chickens in most African societies is a product of social and cultural aspects of societies (Sonaiya, 1990a). The ownership pattern was usually related to decision making in selling and consumption of chicken and eggs. It was noted that men took the major decision-making role in the sell and consumption of chickens and in purchase of foundation stock (Figure 5).

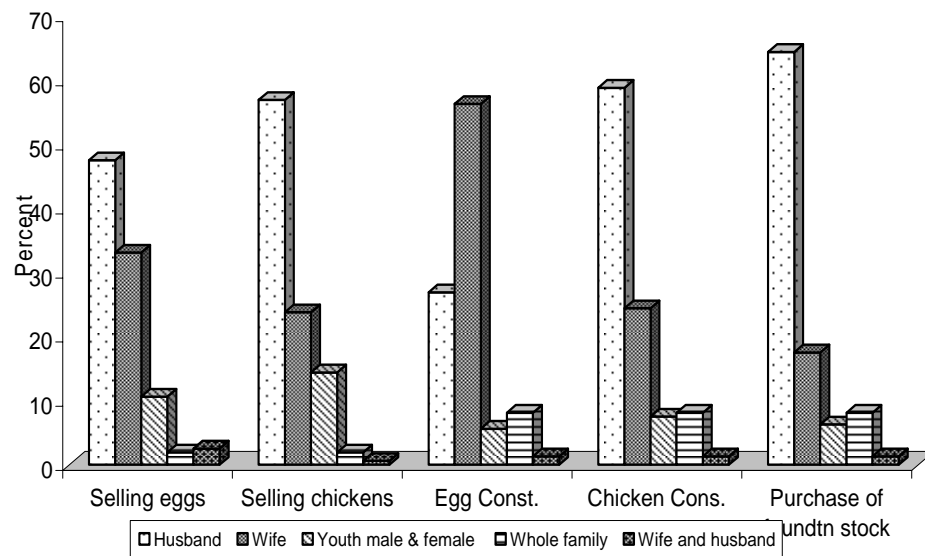


Figure 5. Intra household decision-making power among different gender groups

On the contrary, though women had less decision making role in consumption and sell of chicken and eggs, the report from survey indicated that they played major role in management activities pertinent to poultry production. Figure 6 shows that except in chicken house

construction (arranging roosting material to chicken), which is left for men (53.1%) and male youth (9.4%), women take the lion share in accomplishing other perspectives of poultry management activities including cleaning house (74.4 %), provision of supplementary feed (65%), and providing water (73.8%). This result supports the fact that in smallholder chicken production systems management is predominantly the domain of women (Figure 6).

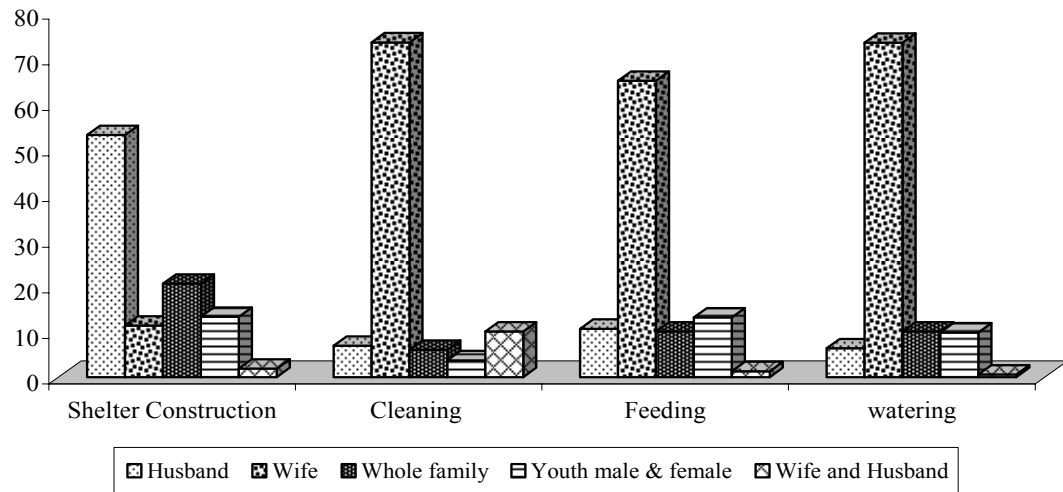


Figure 6. Intra household labor share among gender group with regard to various management duties in chicken production.

## 4.8. Productivity of local chicken

### 4.8.1. Age at first egg

Productivity of birds mainly depends on the production and management system followed in managing the birds. Productivity of birds can be compared in relation to the production system the birds are kept. Summary of the hen reproductive performance based on a research conducted in a rural village chicken production system from selected African countries is presented in Appendix III.

The present study revealed that the overall average age at first egg was 7.07 months and ranged from 5-10 with no significant difference among the three weredas (Table 9). Barua and Yoshimura (2005) for Bangladesh reported the age at first egg 5.75 months for the free-range and backyard chicken production systems. The result from the current research lies within the range reported for Africa and was longer than that of Bangladesh. The findings showed that the local birds in the study area reached sexual maturity lately.

Table 9 Reproductive performance of the hen based on hen history data obtained from the study village.

Parameter	Wonsoho(40)	Loka A.(40)	Dale(80)	Overall	
	Mean $\pm$ SE	Mean $\pm$ SE	Mean $\pm$ SE	Mean	Range
Age at first egg (in month)	6.87 $\pm$ 0.16 <sup>a</sup>	7.07 $\pm$ 0.20 <sup>a</sup>	7.17 $\pm$ 0.09 <sup>a</sup>	7.07	5-10
Clutches per year	3.8 $\pm$ 0.06 <sup>b</sup>	3.50 $\pm$ 0.10 <sup>a</sup>	3.7 $\pm$ 0.062 <sup>b</sup>	3.7	2-6
Clutch length in days	27.7 $\pm$ 0.81 <sup>b</sup>	26.9 $\pm$ 0.95 <sup>b</sup>	25.11 $\pm$ 0.5 <sup>a</sup>	26.2	11-45
Eggs per hen per clutch	16.55 $\pm$ 0.53 <sup>b</sup>	15.4 $\pm$ 0.64 <sup>b</sup>	13.88 $\pm$ 0.29 <sup>a</sup>	14.9	6-26
Eggs per hen per year	62.95 $\pm$ 2.29 <sup>c</sup>	54.9 $\pm$ 3.27 <sup>b</sup>	51.44 $\pm$ 1.4 <sup>a</sup>	55.2	24-104
Inter clutches (Days)	21.75 $\pm$ 1.06 <sup>a</sup>	32.7 $\pm$ 2.7 <sup>c</sup>	24.0 $\pm$ 0.69 <sup>b</sup>	25.6	10-90
Hatchability (%)	77.7 $\pm$ 0.03 <sup>a</sup>	100 $\pm$ 0.03 <sup>a</sup>	86.3 $\pm$ 0.04 <sup>a</sup>	89.1	0-100
Chick mortality (<2m) (%)	45.15 $\pm$ 0.42 <sup>a</sup>	60.96 $\pm$ 0.021 <sup>b</sup>	59.05 $\pm$ 0.15 <sup>b</sup>	55.8	0-100

<sup>a-c</sup> Means within a row with different superscript differ significantly (P<0.05)  
Numbers in brackets indicate number of samples.

#### 4.8.2. Egg production

The average number of clutches per year in this study was 3.7 ranged from 2 to 5 with an average clutch length of 26.2 days. Similar research from Ghana by Awuni (2005) and from Uganda by Ssewanyana *et al* (2004) reported average number of clutch per year as 3.7, and 3.1, respectively for village chicken production. However, the average egg production per hen per clutch was 14.9 ranged from 6-26, which was relatively greater than the nation average eggs/hen/clutch 12 (CSA, 2003). This value was also falls within the range of 10-14 average egg production per clutch per hen reported in Uganda by Ssewanyana *et al* (2004) and

Sudan (Khalafalla, *et al* 2000) in characterization studies of the village chicken production system.

The overall mean annual egg production was 55.2 with a range of 24-104 eggs (Table 9). The findings showed that local chickens had a relatively good egg production potential compared to other findings. For example, Gueye (2003) reported 37-95 eggs for Africa, Barua and Yoshimura (2005) reported 44 eggs for Bangladesh and Ssewanyana *et al.* (2004) reported 40 -50 eggs for Uganda in characterization studies of the village chicken. Similarly, Fiker (2000) and Tadelle and Ogle (1996a) reported 36-42 and 40-60 eggs for Ambo wereda and for the central highlands of Ethiopia, respectively.

Though the local birds in the area reached sexual maturity lately, they exhibited good egg production per clutch as well as per year with a relatively longer clutch size. The higher annual egg production in the study area could be attributed to the manipulation of hen laying cycle, i.e. discouraging brooding. Apart from this, there might be unknown genetic factors associated with the local breed. This could also be an indication of the potential for genetic improvement through selection. However, since egg production is affected by many factors, there is a need for further investigation.

Comparing the three weredas, chickens in Wonsho wereda had the best performance with the highest egg production (62.95 eggs/hen/year), the lowest chick mortality (45.15) and highest clutches per year (3.8), which differed significantly ( $p < 0.05$ ) from the other two weredas (see ANOVA in Appendix V). The annual egg production in a flock is a function of egg production per hen per clutch, clutch size and the proportion of matured hens in a flock. Hence, the significant variation in annual egg production of Wonsho weredas is probably associated with

the high number of clutches with long clutch length in days, and the high egg production per clutch recorded in the wereda, which are a function of management.

#### 4.8.3. Hatchability and mortality

Egg production, hatchability and chick survival are probably the main determinants of the flock productivity in a free-ranging and backyard chicken production system. The average hatchability in this study was 89.1% with no significant variations ( $p < 0.05$ ) among the three weredas (Table 9). The finding in this study was higher than 80.9% reported by Tadelles *et al.* (1996a.) for the central highland of Ethiopia. The value is also higher than 69.7% reported by Eugene (2004) for Philippines and 78% reported by Khalafalla *et al.* (2000) for Sudan in the study of village chicken production system. However, this result is within the range reported for family poultry in low income food-deficit countries of Africa, which is 60-95% (Gueye, 2003). High hatchability can improve poultry production when there is good chick survival. However, the high chick mortality (55.7%) could be one of the reasons for the low flock size per households in the study area. Mortality in the free-range and backyard poultry production system believed to be caused by mismanagement, lack of fresh water and supplementary feed, predators and diseases (Aini, 1990; Pandey, 1992). The chick mortality in this study is higher than the value reported in Uganda (25%) by Ssewanyana *et al.* (2004) for village chickens but lower than the value reported (61%) for the central highlands of Ethiopia by Tadelles and Ogle (1996a). Comparing the three weredas (Table 6) there was significantly ( $p < 0.05$ ) high chick mortality in Loka Abaya and Dale than in Wonsho and this could probably be due to high occurrences of predators and poor management (Personal communication).

The overall mortality of chicken starting from hatching to consumption or sale was 80.5%, of which 55.7% occurred among chicks aged below two months after hatching. The rest 16.5% and 8.3% of the mortality occurred among growers (age group of 2-6 months) and among mature chicken (above 6 months of age), respectively. The rate of mortality decreased with increasing age (Figure 7). Although the study did not examine the causes of chick mortality, it is likely that predators and diseases were responsible. This result indicated that there is a need to put much effort on the reduction of chick's mortality, which could probably bring a dramatic change in the overall productivity of the system. The lower mortality among matured chicken aged above 6 months of age could be due to self escaping capability of matured chicks from predator and inherited resistance to disease.

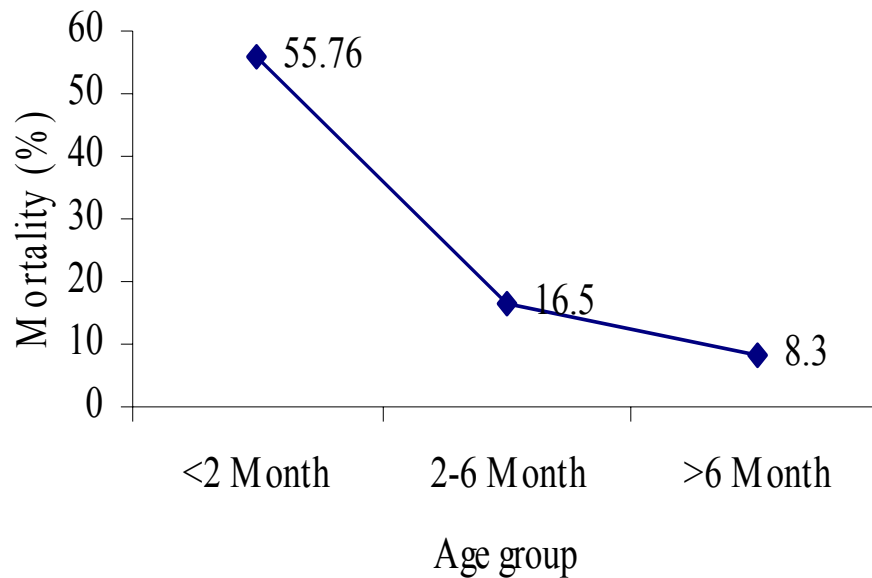


Figure 7. Mortality of chicken at different age category

Hens in the study area on average weaned 4.6 chicks, ranging from 0-15. This is reasonable compared to the egg set per clutch (9.8) with the high chick mortality (55.8%). Similar research conducted in Uganda by Ssewanyana *et al.* (2004) reported 6.3 chicks weaned per hen.

#### 4.8.4. Body weight

In the course of the surveys/interviews the weight of the chicken, which were found in each household were recorded. Accordingly, the overall mean weight of matured (aged above 6 months) male and female chicken was 1.6 (kg) and 1.3 (kg), respectively. Moreover, the overall weight of grower male and female chicken (aged group of 2-6 months) was 1.05 (kg)

and 1.04 (kg), respectively (Table 10). The body weight of grower male of Dale 1.67 (kg) was significantly higher than in Wonsho (0.92 kg) and Loka Abaya (1.06 kg). The grower body weight of females however, did not differ among the three weredas (Table 10). Female chickens were lighter compared to their counterparts in all age categories. The relatively good productivity of the chicken could be attributed to non-genetic factors such as supplementary feeding, concern and care of farmers to their chickens.

Table 10. Body weight of chicken at farmers' hand

<b>Body weight</b>	<b>Wonsho</b>	<b>Loka Abaya</b>	<b>Dale</b>	<b>Overall</b>	
	Mean±SE	Mean±SE	Mean±SE	Mean	Range
Matured Male ( kg )	1.68±0.58 <sup>b</sup> (36)	1.5±0.54 <sup>a</sup> (34)	1.58±0.03 <sup>ab</sup> (69)	1.58	0.60-2.5
Matured Female(kg)	1.17±.058 <sup>a</sup> (39)	1.33±0.05 <sup>b</sup> (40)	1.36±0.02 <sup>b</sup> (74)	1.30	0.50-2
Grower Male(kg)	0.92±0.06 <sup>a</sup> (17)	1.06±.052 <sup>ab</sup> (22)	1.67±0.51 <sup>b</sup> (25)	1.05	0.50-1.6
Grower Female(kg)	1.00±0.86 <sup>a</sup> (10)	1.06±0.07 <sup>a</sup> (20)	1.43±0.28 <sup>a</sup> (36)	1.04	0.20-1.7

<sup>a-c</sup> Means within a row with no common superscript differ significantly (P<0.05)  
Numbers in brackets indicate number of sampled chickens

## 4.9. Management practices

### 4.9.1. Feed and feeding practice

Lack of feed supplementation is one of the characteristics of a free-ranging backyard poultry production system (Gueye, 2003). However, in this study 98.1 % of the respondents practiced scavenging system with supplementary feeding (Table 11). Another study in Awassa Zuria by Asefa (2007) also indicated that 95 % of the households offer supplementary feed. According to the farmer respond, scavenging feed source consists of insect, grass, enset (*Ensete ventricosum*) and harvest leftovers. Similarly, Tadelle *et al.* (2003) reported that insect, grass and harvest leftovers as source of scavenging for village chicken in Ethiopia. Thus, the smallholder chicken production goes eco-friendly because they convert insects and household leftovers to valuable cheap and quality animal protein to the family. However, some farmers in the study area complained that chickens for damage crops, especially Enset (*Ensete ventricosum*) and cabbage (*Brassica oleracea*). Similar research conducted at Awassa Zuria by Girma *et al.* (2004) also reported that in the dry season the chicken ate different parts of the Enset (*Ensete ventricosum*) including the corm. Enset (*Ensete ventricosum*) and cabbage were among the major food crops grown in the surveyed area leading chickens to compete for the same food source with the family. However, certainly one can say this could not be a threat for future development of the sector; it is only a matter of management as it is easily protect by keeping chickens in improved housing facilities.

The major feed and feeding practice of the three Weredas are summarized in Table 11. The major supplementary feed in the surveyed area includes maize (6.3%), Furishika (leftover bought from milling houses) (1.2%), maize and Furishika (23.8%) and feed leftover in the house including sugar beet, “Kocho” (baked enset), and “Amicho” (cooked enset) (68.8%). In most cases, provision of feeds to chicken was seasonal. It also depends on the quantity and availability of the resources in the house. They supply little or nothing by the end of dry season when the feed resource is becoming scarce in the house. About 45.6% of respondents supplement twice a day (usually morning and evening), which seem a common practice in the study area. On the other hand, 40.6% of the respondents supplement their chicken once in a day, while the rest 13.8 % of them provide trice a day. However, there is a need to investigate further about the quality and quantity of supplementary feeds in the study area.

#### 4.9.2. Watering

Water plays an important part in the digestion and metabolism of the fowl in addition it serve as a media to administer some important vaccines. Despite variations in source of water and frequency of watering, almost all of the respondents provided water for their chickens. This is a promising and good experience and could be considered as one aspects of their concern to their chickens. Concerning the source of water, the water given to chickens was drawn from rivers (37%), pond (35%) and borehole (28%). About 75 % of the respondents provided water for their chicken twice a day usually in the morning and evening and 25 % once a day at any time. They usually provided water when the chickens show sign of thirsty. Concerning the drinking materials, 56 % and 38 % used plastic and clay dish containers, respectively. The remaining 4% do not have permanent drinking materials. Vaccinating chickens via drinking

water could be promising as all of the farmers provided water for their chickens. However, only 45.7% of the respondents wash the container regularly and the remaining 50 % wash the container occasionally and 4.4% of the respondents never washed the container.

Table 11. Feed and feeding practice

Parameters	Wonsho		Dale		Loka Abaya		Over all	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
<b>Feeding system(160)</b>								
Scavenging alone	1	2.5	–	–	2	5	3	1.9
Scavenging with supplement	39	97.5	80	100	38	95	157	89.1
<b>Types of supplementary feed(160)</b>								
Maize	1	2.5	5	6.3	4	10.0	10	6.3
Furishika	1	2.5	1	1.2	-	-	2	1.2
Maize And Furishika*	3	7.5	20	25.0	15	37.5	38	23.8
Food Left Over	35	87.5	54	67.5	21	52.5	110	68.8
<b>Frequency of feeding(160)</b>								
Once a day	-	-	15	18.8	7	17.5	22	13.8
Twice a day	20	50	37	46.3	16	40	73	45.6
Trice a day	20	50	28	35	17	42.5	65	40.6
<b>Feeding practice(158)</b>								
put feed in the container	2	5	13	16.3	1	2.5	16	10
Throw on the ground	38	95	65	81.8	39	97.5	142	90

\*(Leftover bought from milling houses)

Numbers in brackets indicate total number of respondents

#### 4.9.3. Housing

Housing is essential to chickens as it protects them against predators, theft, rough weather (rain, sun, cold wind, dropping night temperatures) and to provide shelter for egg laying and broody hen. However, the survey revealed that 97.6 % of the respondents do not have separate house for their chicken. In a group discussion made with the key informants the problem of predators, fear of theft and lack of experience were the main reasons for not constructing separate poultry houses. Concerning roosting arrangements, about 95% of the cases share the main house to spend the night. In some cases (5%), the birds were allowed to roost in an enclosed baskets hanging in the kitchen. Housing facilities in the surveyed area were baskets and cartoons within the keeper's dwelling and perches made of bamboo or a round stick aiming at keeping the birds at night. These baskets and cartoons were located on the floor or in the rafter space within the dwelling. This is obviously the most secure overnight location avoiding predators and theft but not safe for disease transmissions. The other advantage is there is frequent cleaning of the liter.

#### 4.9.4. Predators and disease

In the free-range and backyard poultry production system, diseases are the major limiting factor to the production of indigenous chickens (Aini, 1990). However, predation is a number one and accounted for 65.7% of loss of chicken in the study area. This figure even exceeds for young chickens below eight weeks of age, which are extremely vulnerable to predators. Similar research by Girma *et al*, (2004) in adjacent wereda (Awassa Zuria) reported that out

of the total loss of 130 Fayoumi birds, 104 (80%) were eaten by fox. Thus, it is apparent that for young chickens, predation by birds, fox and wildcat (Shelemtemat) contribute to substantial losses of the flock.

Farmers acknowledged that diseases are also the major cause for the loss of chicken, accounting for 23.1% of the loss. About 62.9% of the respondents confirmed the presence of dangerous disease outbreak in the area, which caused complete devastation of the flock. The fate of birds that become sick at any time in the surveyed area were cases treated (61.4%), or immediately sold (11.8 %) or consumed (0.1%). About 72% of the respondents treat their chicken themselves and only 10% of them have access to veterinary services from the weredas Agricultural and Rural Development Office (ARDO). To treat their sick chickens, most of the farmers (87.6%) use traditional remedies, which are usually administered through drinking water, whereas few (12.4%) use modern medicine (Table 12). This result revealed that farmers do not get veterinary services regularly indicating the existence of gap in this respect.

The major diseases reported in the study area, in the order of their importance, were Newcastle disease, coccidiosis and fowl typhoid. Research work in some African countries such as Benin (Chrysostome *et al.*, 1995), Burkina Faso (Bourzat and Saunders, 1990), Mauritania (Bell *et al.*, 1990) and Tanzania (Yongolo, 1996) reported that Newcastle is the most devastating disease in village chickens. The common disease reported in the study area was similar with the previous findings that were reported 10 years back.

Table 12. Scenario of disease outbreak and treatment

<b>Characteristics</b>	<b>Number respondent</b>	<b>Percent respondent</b>
<b>Fate of sick chickens (153)</b>		
Consumed	1	0.7
Sold	17	11.1
Treated	76	49.7
Removed	59	38.6
<b>Disease outbreak (159)</b>		
Yes	100	62.9
No	59	37.1
<b>Action taken (143)</b>		
Treat them Myself	103	72.0
Call for Vet.	21	14.7
Sell them immediately	15	10.5
No action	4	2.8
<b>Vaccine (151)</b>		
Yes	16	10.6
No	135	89.4
<b>Treatment (153)</b>		
Traditional	134	87.6
Modern	19	12.4

Numbers in brackets indicate total number of respondents

However, Newcastle became the major reason for the loss caused by disease; this mainly because farmers in the area have no proper prevention mechanism and do not have proper vaccination program to their chicken. There is also a favorable condition for the transmission

of the diseases, which is likely associated with the nature of the rearing practice. This is because local keepers in the surveyed area rear scavenging poultry with, relatively no separate housing, no veterinary services and high degree of contact with the neighbor chicken.

According to the discussions made with the wereda veterinary experts, the Newcastle disease was found to be an important limiting factor in expanding the productivity of poultry in the study area by causing high chick and matured bird mortality. Other health problems in village chickens are external and internal parasites. A study on ecto-parasites of domestic fowls in Nigeria showed that lice (*Menacanthus stramineus*) were the major problem in rural poultry (Zaria *et al.*, 1993). Though this study did not attempt to cover all aspects of the prevailing diseases, discussion made with the wereda veterinary expert showed that, the external parasite is one of the health problems in the study area and it was associated with season variations, higher rates of infestation being occurred during the rainy seasons.

#### 4.10. Broody hen management

In the traditional backyard poultry production system, by its very nature hens are responsible for the new flocks. Likewise in the study area, it is not uncommon to see hens with their follower chicks. The overall nature of the broody hen management of the surveyed area is shown in Table 13. Natural incubation is the most commonly used method for replacing and increasing the size of flocks. A hen often finds a dark and quite place in the house for laying eggs. After the eggs were collected, farmers adjust nest boxes for broody hens. Usually they use bamboo made baskets, cartoons and they also sit the hen simply on the ground (putting some bedding materials like worn clothes, grass) and in some cases use clay pot. Farmers are

very conscious and concerned in the preparation of appropriate nest boxes for incubation of broody hen.

Assuming that there is good feed resource and conducive environment for growing chicks during the dry seasons, about 89.4 % of the respondents used to incubate and brood their hen during the dry seasons. About 8.75% of the respondents do not have any specific choice of season for incubation. Broodiness of a given chicken breed is genetically inherited. A bird has to be broody after laying eggs so that it would incubate, hatch the eggs and raise their young chicks. However, as opposed to commercial layer farms which select against broodiness, farmers (93.1%) in the study area made selection towards broodiness based on different criteria including previous performance of the hen (50.7%), body size (32.2%) and ample plumage (17.1%).

Nearly all farmers (98.13%) use eggs laid within the house as the source of eggs for incubation. The remaining (1.87%) purchase eggs from local markets. On the average, 9.8 eggs were set per hen per clutch with an average hatchability of 89.1 %. The number of eggs set for natural incubation in this study is in agreement with previous works by Asefa (2007) for Awassa Zuria who reported 9.8 eggs. Nevertheless, the average number of eggs set in this study was less than reported by Alemu *et al.* (2003) for other parts of Ethiopia. Kigali (1997) also reported 13 eggs for Gambia and 15 for Republic of Tanzania.

Table 13. Broody hen management

<b>Parameter</b>	<b>Number respondents</b>	<b>Percent respondents</b>
<b>Criteria for broody hens selection (152)</b>		
Previous performance	77	50.65
Larger body Size	49	32.23
Ample plumage	26	17.10
<b>Source of eggs for incubation (160)</b>		
Laid in the house	157	98.13
Purchase	3	1.87
<b>Time of egg incubation (160)</b>		
Dry Season	143	89.37
Wet Season	3	1.87
Any Season	14	8.75
<b>Nest boxes for broody hens (158)</b>		
Clay Pot	4	2.53
Cartoon	46	29.11
Bamboo made brooder	57	36.07
On the ground	51	32.27
<b>Practice to avoid broodiness (159)</b>		
Piercing the nostrils	4	2.5
Hanging the bird upside down	46	28.9
Disturbing the nest	47	29.6
Moving to neighbors	62	39.0

Local hens are good sitters and show a good mothering ability, one of the desirable traits identified by the farmers. The ability to hatch their own eggs together with high hatchability makes the local chickens appropriate for the prevailing farming system. Nevertheless, it does not mean that there is no need for improvement.

In most of the cases, farmers let young chicks to follow their mother hen immediately after hatching. Consequently, chicks were subject to scavenge backyard with vigorous members of the flock, which is difficult to compete. Thus, this will result in poor nutrition, vulnerability to predation and disease, which ultimately causes high chick mortality during the first two months of age.

Traditionally all households attempt to increase egg production by stimulating broody birds to resume laying. Farmers in the study area practiced different methods to break broodiness in hens. These include piercing the nostrils with a feather to prevent sitting (2.6%), physically moving the bird to nearby house for a couple of days (39.0%), by hanging the bird upside down for about 3-4 consecutive days (28.9%) and disturbing the sitting nest-boxes (29.6%). The purpose of such practices was to disturb the broody bird and to cause a hormonal shift so that it starts to lay eggs again within 8-10 days. Such practice could be responsible for the relatively better performance of the local chickens in the study area.

About 86.9% of the respondents had the experience in culling birds from the flock for different reasons. About 65% of the respondents avoid male birds from the flock to avoid cockfight and to maintain the existing male to female ratio. Culled cocks were consumed 13.5% or sold out 86.5%. About 86.7% of the respondents remove hens from the flock when the hen got sick

where as 10.3 % of the respondent cull or remove hens when they anticipated occurrence of disease outbreak. The remaining 3% of the respondents remove hens from the flock due to low productivity. This result indicates that farmers in the study area remove chickens of both sex for different reasons and purpose. However, unproductive hens remain in the flocks without being removed.

## 4.11. Marketing

### 4.11.1. Major characteristics of chicken markets

The major characteristics of chicken markets are shown in Table 14. In general, there is no systematic marketing operation of poultry and poultry products in the study areas. Selling of live birds and eggs were a common practice in the country as well as in the study sites. Selling of live chickens was done at the farm gate, at the nearby small village market (primary market) and main market (Secondary market in the town). Farmers in the study area sale their chicken in the conventional market days. There are two types of market days in the study weredas. The ‘fixed day markets’ which is found only in Dale wereda and it usually takes place on fixed days of the week. The fixed day market are Sidetegna that holds every week on Mondays and Thursdays and Arada market on Saturday and Aposto market that takes place every Tuesdays and Fridays. The second market days called ‘random markets’, which are found in all the three Weredas, and are held on every five days. The ‘random markets’ that took place every five-day, is named locally as ‘Dela’, ‘Deko’, ‘Kebado’ and ‘Kebalenka’. They usually occurred in different places of the three wereda at different day of the week.

More than half of the respondents (65%) do not have any information about the price of the chicken before they went to markets. Only 35% get price information which either obtains information from their neighbors (43.3%) or after they reach to market (56.7%).

Farmers sale their chicken mostly when there is an instant cash need in the house (65.6%) , when there is disease outbreak to occurs (24.4%) and during the major crop planting seasons (10%) usually occurred from the beginning of the main rainy season. As it is the case for most rural areas in Ethiopia, there is no well-organized formal poultry and poultry products marketing scheme in the surveyed area. The problem is more severe for newly established Wonsoho and Loka Abaya weredas. The place assigned for selling chicken has no shade. The market places were not good enough to accommodate the chicken and cause overcrowding and the problem was serious during holidays.

Table 14. Marketing characteristics of the study area

<b>Characteristics</b>	<b>Number Respondents</b>	<b>Percent respondents</b>
<b>Price information (104)</b>		
From neighbors	45	43.3
From the market	59	56.7
<b>Reasons for selling (157)</b>		
When need of money	103	65.6
When disease out break	38	24.4
Farm season	16	10
<b>Death of chickens during Transport (158)</b>		
Yes	-	-
No	158	100
<b>Mode of transport (158)</b>		
Embracing by hand	98	62
Hanging by hand	60	38
<b>Season of selling (158)</b>		
Rainy Season	60	38.0
Dry season	43	27.2
Any season	55	34.8

Numbers in brackets indicate number of respondents

On the average, farmers in the surveyed area traveled 2.49 km ranged from 0.5-6 Km to reach to the main markets (secondary markets). The mode of transportation of chickens for producer (farmers) were mainly by hand usually embracing (62%) and hanging the chicken down ward (38%). However, the gate collector sometimes use hand driven cart (Gari) together with some market goods an ideal picture presented in Figure 8.



Figure 8. Picture showing mode of transportation for collector.

The chain of poultry and eggs marketing in both rural and urban is presented in Figure 9. The marketing of eggs follows more or less the same channels; eggs produced are sold at the farm gate to egg collectors, in the open markets to middlemen and to consumers and to retail shops, hotels and supermarkets in the towns. Accordingly, eggs pass through a relatively longer chain to reach the consumers than live birds because eggs reach consumers through kiosks, shops and supermarkets. The main stakeholders in the marketing chains are the village and market level collectors, the second trader or (whole seller) and the local kiosk, shops, supermarkets, restaurant and hotels.

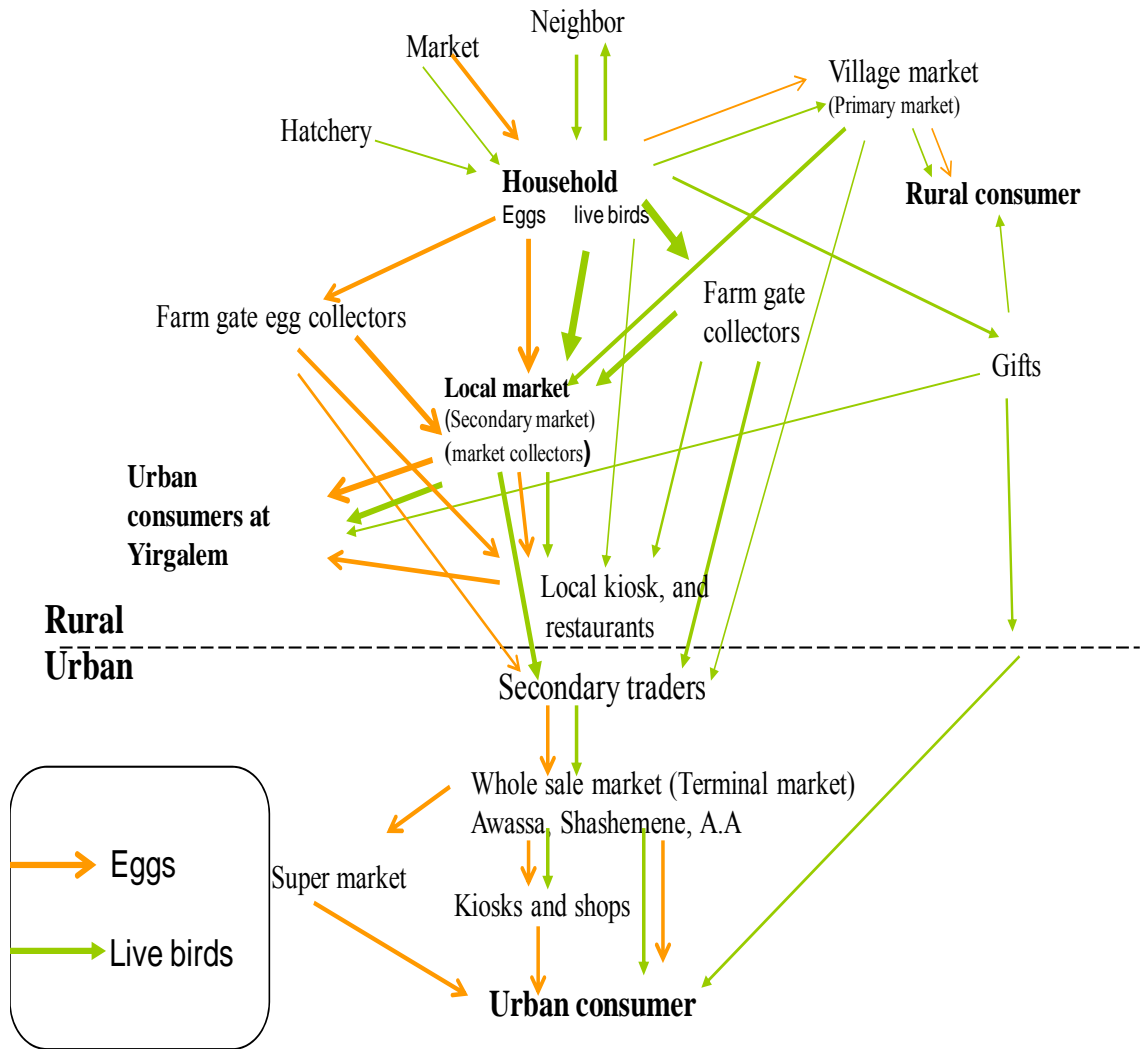


Figure 9. Value chain for indigenous poultry and eggs in the study area

#### 4.11.2. The plumage color of chickens in the markets

During the course of the work the different color of chickens in the market were recorded in all age groups (Figures 10 and 11). It was found that red color covered nearly 50% in both sexes for matured and grower chickens. The next most commonly colors were black followed by, white color, grey (Gebsema) and mixed color (composed of white with black spot, red with black spot). The high frequency of red colored chicken appearing in the market is related to the high market frequency.

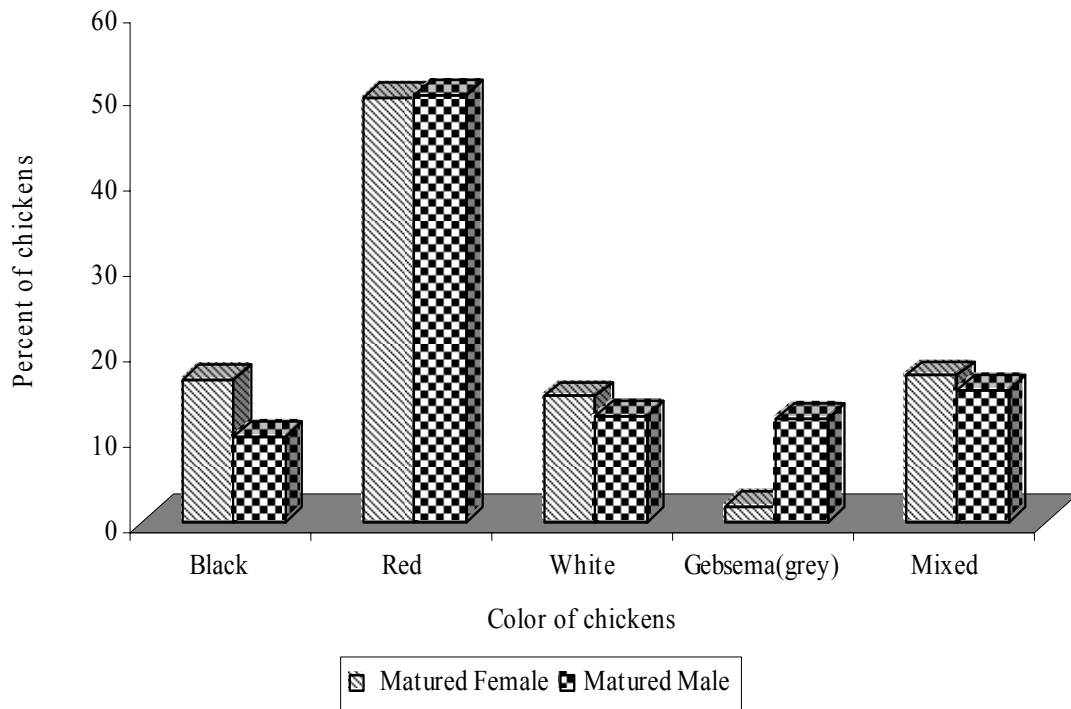


Figure 10. Color composition of matured male and female chicken in the markets

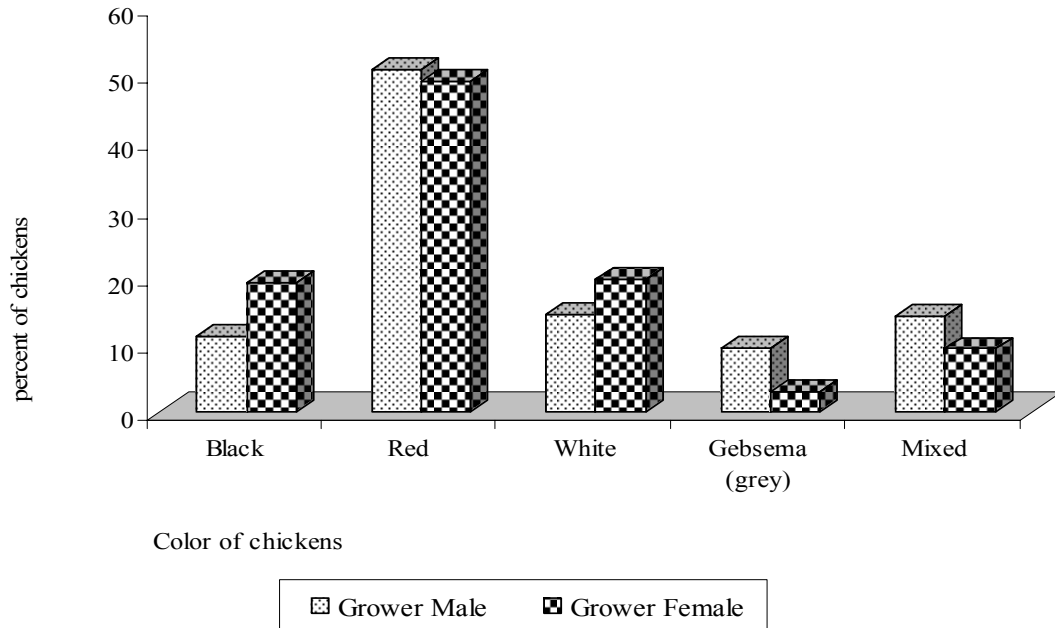


Figure 11. Color composition of grower male and female chicken in the markets

#### 4.11.3. Profiles of sellers in the markets

Attempt was made to overview the composition of sellers in five-selected markets. Accordingly, about 16.5 % and 9.63 % were primary school male and female students, respectively whereas junior male and female together covered 24.72 % (Fig.12).

In general, primary and junior male and female together accounted for 50.83 % and were the largest players in the markets. This result indicates that students particularly those in junior and primary schools are highly involved in poultry marketing thus, the future marketing information system should target these groups. The non-students category, which includes

husband and wife, young illiterate farmers, and dropouts, covers 17.55 % male and 19.75 % of the females. There is a need to consider this gender category as well.

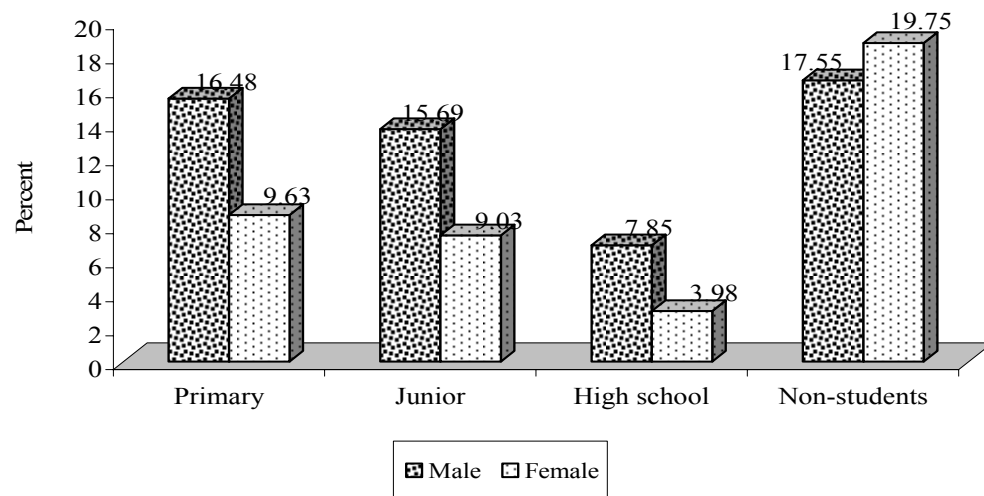


Figure 12. Proportional distribution of sellers in the market with their educational background

#### 4.11.4. Volumes of live birds and eggs marketed

The marketing channel followed is simple usually chickens and eggs are often sold by farmer's reaches consumers directly and in most of the cases after being passed through intermediates called village level collectors and market level collectors (Middlemen). The most common form of poultry marketing channels with the volume of sale in the study area is shown in Figure 13. About 50.8% of the poultry passed through middlemen (collectors in the

open market), 13.8 % reach through restaurant and hotels, and 31.5% directly to the consumer the remaining (4.8%) passed through the farm gate chicken collectors to consumers. The proportions of sell that pass through market collectors are expected to be more than this figure during holydays and festivals. There are two possible reasons for the high proportions of sale through market level collector (middlemen). Women usually come to markets with the aim to purchase some basic materials for the household consumption. As a result, they don't stay for a long time in the market and sell their chicken immediately to market chicken collectors. Secondly, observation in the market indicated that market collector enforced the farmers to sell for them at lower price. With this regards, farmers usually criticize being exploited by market collectors. The major marketing constraints in the surveyed Weredas are the small number of chickens offered and lack of market information.

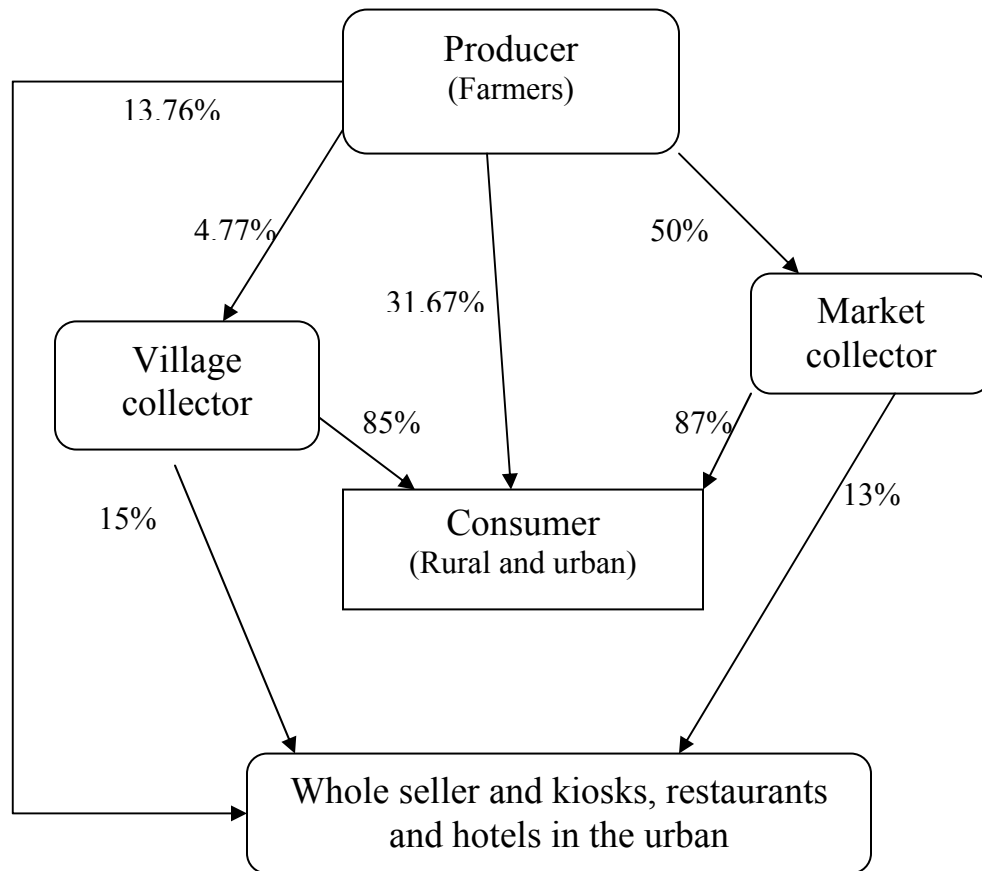


Figure 13. Marketing channels for chicken predominately existing in the study area and volume of chicken marketed

Comparing the three weredas (Table 15) in Loka Abaya and Wonsho weredas the largest number of chickens ( 65.5% and 82.1%) passed through the market level collector (middle men) in the open market, respectively. Surprisingly, these middlemen usually sale the chicken at higher price on the same market or shift the unsold chicken to the nearby markets in Dale town and Aposto market on the respective market days. Some of the farmers found to sale by wondering house-to-house in the town or on roadside for travelers. There were no village level

collectors in the lowland. This is mainly because of the poor infrastructure and dispersed location of the farmers in lowlands.

Among the three Weredas, the largest proportion of poultry sale directly to consumer occurred in dale market (43.6%) followed by Loka Abaya (34.5%) and Wonsho (16.4%). This was mainly due to the relatively high demand and premium price offered in the main towns. Interviewed consumers (87%) also prefer to purchase directly from the farmers (producers) reasoning the relatively rational price set by farmers than market level collectors. Farmers sell their chicken to consumers not only in the open market places, but also through wandering within the city or knocking the gate of hotels, restaurant and city dwellers. This was very difficult to assess and quantify. Therefore, the volume of sell for consumer could be higher than reported especially for Dale. The finding in this study confirms that the market level collectors in open markets are the key player in the marketing channel as the majority of chicken reach the consumer through them. They also play a decisive role in determining the price of chicken in the market.

Table 15. Marketing channel of the three Weredas

Wereda	Sell to stakeholders in %		
	Village collectors/neighbors	Collector in the market	Sell to consumers*
Loka Abya	0	65.53	34.47
Dale	8.82	47.81	43.36
Wonsho	1.49	82.13	16.37

\* The consumers include kiosk, restaurants and local hotels

#### 4.11.5. Price of poultry and poultry products at farm gate

The respondent estimation of chicken price during ordinary and holidays is presented in Table 16. Variations in poultry prices are not only influenced by weight and age of chickens but also by seasons and holidays. Farmers get better prices for both egg and live birds during holiday markets. According to farmers, comparatively higher prices birr 32.9 (n=159) ranging from 18-60 and birr 19.15 (n=159) ranging birr 8-35 per birds were given for matured cocks and matured female hens, respectively during holidays. There was a premium price during Christmas and Ethiopian Easter. The prices offered in this findings were relatively higher compared to (Tadelle *et al.*, 2003) who reported birr 21.5 (30) with a range of 12.5-30 birr and birr 13.4 with a range of 9-10 birr for matured cock and matured female, respectively during holidays. This finding is still higher than that of Asefa (2007) who reported birr 27.24 and birr 15.51 for matured male and female birds, respectively in the study made in and around *Umbullo Wachu* watershed of Awassa Zuria.

It was very difficult to come up with concrete reasons for such variations in prices that could be attributable to other factors. For unit egg, farmers get comparatively better price 0.57 (n=156) ranging 0.5-0.75 birr again on a holiday markets. This price is similar to birr 0.46 per egg reported by Tadelle *et al.* (2003) for Debrezeit area in the year 2001 during festival of Ethiopian Easter (0.40–0.50 birr) and also reported by Asefa (2007) in the study made in and around *Umbullo Wachu* watershed.

Table 16. Farm gate chicken price in birr

Chicken category	Normal days		Holidays	
	Mean $\pm$ SD	Range	Mean $\pm$ SD	Range
Matured male	21.74 $\pm$ 0.54 (78)	10-30	32.94 $\pm$ 8.16 (159)	18-60
Matured female	13.95 $\pm$ 0.43 (78)	7-35	19.15 $\pm$ 5.56 (159)	8-35
Grower male	13.64 $\pm$ 3.80 (77)	7-23	15.68 $\pm$ 4.87 (128)	10-30
Grower female	9.16 $\pm$ 2.72 (77)	5-15	12.66 $\pm$ 3.74 (128)	6-25
Unit Egg	0.40 $\pm$ .12 (91)	0.15 - 0.65	0.57 $\pm$ .08 (156)	0.5-0.75

1US=9.31 birr

Number in brackets indicate number of observation

#### 4.11.6. Seasonal variations in chicken price at local market

The monthly average price of chickens under different age category from December 2006 to June 2007 is shown in Figure 14. The highest price was recorded in December this due to Christmas market. The price in all age categories declined from December to June with a slight increase in price during March, which was caused by Ethiopian Easter. Both demand

and supply during this period was also high and has effect on price similar trends of prices were also reported by Tadelle *et al.* (2003) and Kena *et al.* (2002).

The lowest price was recorded in June. This was probably because of planting time and farmers sell out their chicken before the onset of the rainy season as fearing disease outbreak to occur. Unlike the matured male and female, the prices for both growers male and female goes nearly constant. It appears that poultry price is influenced mostly by rising and falling demands during religious festivals and on set of planting seasons.

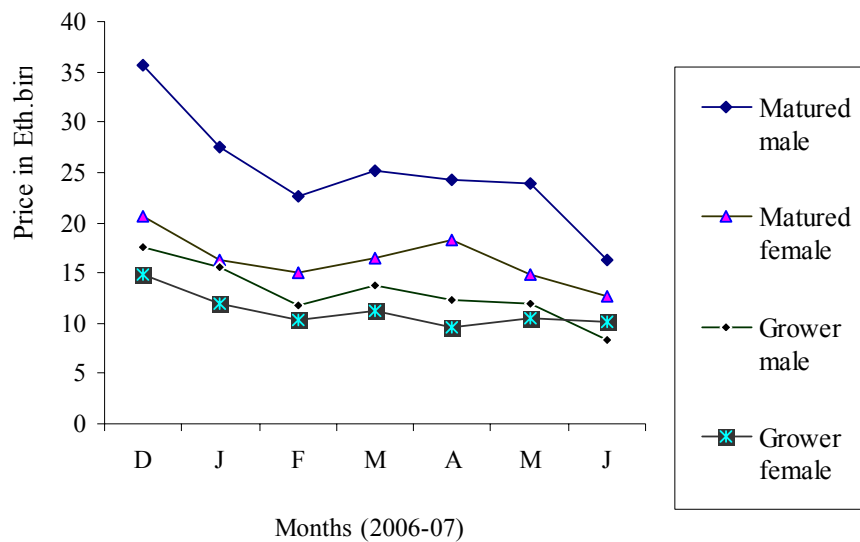


Figure 14. Seasonal variations of chicken price (Data collected from five-selected markets from the study area)

## 5. Summary and conclusion

Poultry production in Ethiopia is a chain of interrelated economic activities undertaken within a social context. These activities can range from the raising of poultry to the buying and selling of poultry and poultry products. Understanding the scenario of poultry production, market and marketing chain, and the dynamics within the system will be crucial to develop strategies and improve the system. Thus, hundred and sixty households owning five chicken and above and forty five consumers and sellers were interviewed to assess the production and marketing systems of three weredas in SNNPRS. In addition, more than two thousand chickens from the open markets were weighed and their price and colors were recorded from December 2006 to June -07 to evaluate the seasonal variations in chicken price.

A vast number of household women and children actively participate in poultry production using their own indigenous breed and local knowledge of poultry management to generate income and/or to complement the protein requirement of the households.

The most dominant chicken production systems in the study area were the back yard extensive systems based on the local indigenous birds and scavenging with occasional and seasonal supplementary feeding of homegrown grains and household food refusals with no specific poultry houses. None of the respondents has access to proper vaccination program and proper prevention mechanism to their chickens. The high hatchability (89 %) and mortality (80%) are the two conflicting feature of the system. It was noted that men took the major ownership and took part in the major decision making in selling, consumption and purchase of foundation stock than his female counterpart. On the contrary, women engaged in major management activities pertinent to poultry production.

Results of this study showed that the overall mean flock size was 9.22 and ranged from 3 -26. The mean annual egg production of the local hen was 55.2 and ranged from 24-104eggs. The average egg production per clutch was 14.9 ranging from 6-26 eggs. The mean clutches per year was 3.7 ranging from 2-5 clutches. Sixty five percent of the respondents do not have any information about the price of chicken before they went to markets. As it is the case for most rural areas in Ethiopia, there were also no well-organized formal poultry and poultry products marketing groups. The reported critical constraints of the smallholder poultry production in the study area were partly due to the prevailing poor management practices, in particular predation, lack of proper health care, poor housing and poor marketing information.

Despite the many problems involved in keeping poultry, relatively promising performance of the local chicken in the study area were observed which is explained in terms of high hatchability, relatively good egg production per year and per clutches. Moreover, nearly all households provided supplementary feed and water to their chickens, and this could be considered as the strength of the sector. Almost all the interviewed farmers also need to pursue boosting up the chicken production and productivity. This is perhaps considered as an opportunity and potential for poultry production and development endeavors in the study area.

## 6. Recommendations

In the past few decades, Ethiopia has been experiencing recurrent drought, successive an overwhelming population explosion and an immense environmental degradation that have led the country to a sever shortfall in domestic food supply. To overturn the phenomena the country has to intervene on every possible income-generating alternative in order to perpetuate the livelihood of its people. In this regard, poultry production could assume one of priority to meet the vision. Moreover, knowledge exists that poultry can be used as a tool for poverty alleviation and any attempt and/or decision to improve the poultry production has direct impact on strengthening of women's status. Thus, the following recommendations are suggested based on the survey result and the above concrete perceptions.

The productivity of scavenging birds in the study area can be enhanced by relatively simple changes in management techniques that promote improvement in productivity and reduce mortality. For instance, predation is a number one and a significant cause for the loss of chicken from the flock in the study area. Simple house construction especially designed for chicks using locally available materials can easily save from harm. Moreover, administration of regular disease prevention mechanism and appropriate vaccination program will undoubtedly reduce mortality. A little technical support on farmers' experience or knowledge of supplementary feeding and watering could improve productivity of chickens. Market information system at school level or at grass root (farmer) level is a prerequisite for short-term improvement of the sector.

However, for the long-term change in productivity and profitability of chicken in the study area the following should be taken in to consideration:-

- Formation of both production and marketing groups and establishing a stable marketing chain is important so that the farmers could obtain premium price of the markets.
- There is a need to link production with marketing focusing on market-oriented production of chickens and the extension intervention should address both production (productivity) and marketing.
- Training for both farmer and extension staffs focusing on disease control, improved housing, feeding and market entrepreneurship.

Ultimately, attempt should made to shift the production paradigm to improved backyard production along with a holistic supports of services such as health, extension, credit and marketing to make it productive and profitable. The first step could be increasing the current household flock size taking into account the finite nature of scavenging feed resources in the surroundings of the homestead and competition for the same food resource. Flock size can be increase through administering small scale or mini-hatcheries at village level or at wereda level that could collect and use local eggs. For bridging this gap there is a need to make readily available credit service particularly intended for poultry production and this calls for special and urgent intervention by concerned government institutions and NGOs.

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## 8. Appendices

### Appendix I. Total livestock distribution in (TLU) in three Weredas per total household

Types of Live stock	Livestock in TLU per HH			Overall
	Wonsho	Dale	Loka Abaya	Average TLU per HH
Cow	1.73(38)	1.48(71)	1.58(37)	1.57(146)
Oxen	0(0)	1.93(4)	1.68(21)	1.72(25)
Calf	0.33(28)	1.63(41)	0.39(34)	0.87(103)
Heifer	0.74(17)	0.81(36)	0.75(26)	0.77(79)
bull	1.59(18)	1.68(19)	1.5(11)	0.6(48)
Sheep	0.3(14)	0.21(27)	0.22(18)	0.24(59)
Goat	0.3(7)	0.17(11)	0.32(18)	0.27(36)
Donkey	0.5(2)	0.72(9)	0.56(8)	0.63(19)
Chicken	0.06(40)	0.1(80)	0.11(40)	0.092(160)

The number in the bracket show respondents owning animals

Appendix II. Conversion of livestock number to Tropical Livestock Unit (TLU)

<b>Livestock Type</b>	<b>Tropical Livestock Unit (TLU)</b>
bull	1.10
Cows (local)	0.80
Cows (cross)	1.20*
Heifers	0.5
Immature males	0.60
calves	0.20
sheep	0.10
Goats	0.10
Horses	0.80
Donkeys	0.50
Chickens	0.01

Source: Gryseels, 199) (Janke, 198) (Ibrahim, 20\*

Appendix III. Literature on reproductive performance of chicken in free range rural village chicken production system in selected African countries

Source and country	Production parameter								
	Age at first egg in weeks	Number of clutches per year	Egg per clutch per hen	Egg per hen per year	Egg set per clutch	Hatchability (%)	Chick Mortality (%)	Matured male body weight (kg)	Female body wt (kg)
(Gueye, 2003). <i>Africa.</i>	24-36	-	-	37-95		60-95		1.2-3.2	.7-2.2kg
(Barua and Yoshimura , 2005) Bangladsh	23	-	-	44	-	-	-	-	1.30±0.60
(Eugene <i>et al.</i> , 2004) Philippines			8.4		6.3	67.9			
(Awuni, 2005) Ghana	-	3.7	10	-	9.3	76	-	-	-
(Ssewanyana <i>et al.</i> , 2004) Uganda		2-3	14	40-50		80-90	25	2.1	1.4
(Khalafalla, <i>etal.</i> , 2000) Sudan		3.1	12			78			
(Fiker, 2000) Ethiopia				36-42		68-85			
(Tadelle and Ogle, 1996a.) Ethiopia				40-60		80.9±11	61		

Appendix IV ANOVA for family, farm and chicken size of the surveyed area

Source	df	Mean square	F value	Pr>F
Size of the farm	2	.21	.56	.52
Error	157	.37		
Size of the family	2	13.67	2.16	.118
Error	157	6.32		
Total chicken per HH	2	256.68	15.13	.000
Error	157	16.97		

Appendix V. ANOVA for performance of chicken in the study area

Variables	df	Mean square	F	Pr>F	CV (%)
Age at first egg	2	1.2	1.12	.330	14.66
Error	157	1.08			
Number of clutches per year	2	.95	3.03	0.051	15.43
Error	157	.313			
Clutch length in days	2	102.1	3.96	0.021	19.73
Error	157	25.78			
Number of eggs laid per hen per clutch	2	100.8	9.7	0.000	22.73
Error	157	10.39			
Number of egg laid per hen per year	2	1768.52	7.39	0.001	29.11
Error	157	239.06			
Inter clutch	2	1407.03	9.79	0.000	24.75
Error	157	103.54			

Appendix VI Photos taken from the market surveys.



Figure 1. A woman on selling her grower chickens in Wonsh market



Figure 2. chickens on sale in Arada market



Figure 3. Mode of transportation (Wonsho market)



Figure 4. Market data collection in Wonsho market



Figure 5. Market data collection in Loka Abaya market (weighing chicken in the market)