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Original Research Article

Assesment of Production and Management System of Village Chicken Reared Under Farmers Condation in Angecha and Damboya Districts of Kembata Tembaro Zone, Southern Ethiopia

Edao Shanku[1*], Eskindir Amanuel[2]

[1]Ethiopian Institute of Agriculture Research Wondo genet Agricultural Research Center POBox. 198 Shashemane, Ethiopia
[2]Wachemo University, Durame Campus, College of Agricultural Sciences, Department of Animal Science, Ethiopia

***Corresponding author:** Edao Shanku

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Abstract: The study was conducted in two selected districts of Kembata Tembaro Zone, Southern Ethiopia with an aim of assessing the production system, performance and selected egg quality of village chicken reared under traditional management system. Multi-stage sampling technique was used to select representative sample and one hundred eight six respondents (186) were interviewed with structured questionnaire. The data were organized and analyzed by using SPSS and SAS. The mean of Eggs per clutch per hen, Age at first lay, and number of clutches per hen/year were 15.82±0.54, 7.08±0.25, 5.26±0.25 and Age of sexual Maturity (Male=7.67±0.306 and female= 8.13±0.301), respectively. The predominate breed is hybrid (59.6%) with village chicken production system. 50.55% of the respondents keep chicken in Perch at one corner in common house, 45.70% were practicing of isolation of sick birds from healthy to prevent disease transmission. The mean of eggs incubated, hatched and hatchability of percentages were (14.5±0.55, 12.5±0.57 and 80.5), respectively. The study revealed that 40.32, 26.2 and 17.32% of respondent's rear chicken for sale, home consumption and non-defined purpose, respectively. The highest percentage of the respondent's utilized eggs for selling purpose 30.1% (Mid-land) and 31.7% (High land). Regarding egg storage condition in high land and mid land agro ecology about 21.5% and 18.3% of the respondents store their eggs in inside cold container respectively. The major constraints of chicken production in the study areas were prevalence of disease, high chick mortality, predator attack, shortage of feed and grains and lack of parent stock, respectively. The most economically important disease that attacks chicken was Newcastle disease which is locally known as "Kenbesha" in the study areas.

Keywords: Chicken, Constraints, Kenbesha, shululla, Multi-stage sampling.

INTRODUCTION

In Ethiopia, agriculture plays a major role in livelihoods of most people. The sector employs about 12 million smallholder farmers and 12 to 15 million pastoral and agro-pastoral communities respectively and accounts for about 95% of agricultural production (FAO, 2018). Moreover, the sector contributes about 85% of employment, 90% of total export earnings and 45% of the Gross Domestic Product (FAO, 2018). Out of this, poultry production covers about 40% of the agricultural output in the national economy and contributes 13-16% of the total Gross Domestic product (GDP) (Melkamu *et al*., 2013). Thus, the word poultry is synonymous with chickens under the present Ethiopian condition. According to Milkias *et al*., (2019), the global poultry population is approximately 16.2 billion, of which 71.6% is found in developing countries. In Africa, village poultry contributes over 70% of poultry products and 20% of animal protein intake (Kejela *et al*., 2019). In Sub Saharan Africa (SSA), rural chicken production accounts for about 60% of poultry with indigenous chickens constituting 70% of the total chicken population (Kejela *et al.*, 2019). Moreover, in east Africa over 80% of human population resides in rural areas and over 75% of these households keep indigenous chickens (Hirwa *et al*., 2019). Ethiopia has about 60% of the total chicken population of East Africa, which includes local, hybrid and exotic chicken breeds. Report on population of Ethiopian chickens has been estimated to be about 41.35 million and with regard to breed, 78.04 %,17.58% and 4.34 % of the total poultry population to be indigenous,

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hybrid and exotic, respectively (CSA, 2022). Annual egg production from local chicken under farmer management ranges from 53 to 60 eggs per hen (Halima, 2007). However, the evolution of poultry production has signified a growing importance among small and medium-scale farmers residing in the rural areas (Milkias *et al.*, 2019).

According to (Moussa *et al*., 2019), poultry production plays a significant economic role and is practiced by about 80% of the rural populations. In developing world, indigenous chickens are widely distributed in almost all the rural and peri-urban areas where they play an important role in income generation and food production (Moreki *et al.*, 2010). In Ethiopia, rural poultry represents a significant part of the national economy in general and the rural economy in particular and contributes 98.5% and 99.2% of the national egg and chicken meat production, respectively (Khalafalla *et al.*, 2001). However, the economic contribution of the sector is not still proportional to the huge chicken numbers. The constraints include diseases, predators, lack of proper healthcare, feed source and poor marketing information that hinder the production and productivity of the chickens in most area of the country. Among the above obstacles, diseases are the main constraints incriminated for reduction of total numbers and compromised productivity (Natnael, 2015). Poultry production is one of the major contributors for the livelihoods of majority of the rural farmers in Angacha and Damboya Woreda. In addition to this, the poultry enterprise has potential to promote economic growth in developing countries through employment, provision of income and sustenance of rural populations (Mwobobia *et al*., 2016). As a result, the owners do not aware those challenges and problems clearly and properly. Thus, this calls for further investigation on the challenges and opportunities which influences chicken production performance in the study areas. Finally, in this study an attempt was made to assess production system, performance of village chickens under traditional management system in Angacha and Damboya Districts with the following objectives:

- To assess the production system and performance of village chicken under traditional management system in the study area
- To identify the major challenges and opportunities associated with chicken production in the study area

MATERIALS AND METHODS

Description of the Study Area

The study was conducted in Angacha and Damboya districts of Kembata Tambaro zone southern Ethiopia. Kembata Tembaro zone is located, 250 km south-west of Addis Ababa. The whole Kembata Tambaro zone is located between 1500 and 3500 meters above sea level, and the topography characterized by steep slope at the foot of Anbericho, Deto and Ketta mountains. Angacha is one of the seven districts of Kembata Tambaro zone. The district is divided into 21 administrative kebeles. Among these 21 kebeles, 17 kebeles are rural and 4 kebeles are urban. It is located at a distance of 257 km south of Addis Ababa, the capital city of Ethiopia, 125 km away from the Former regional capital city, Hawassa and about 32 km away from the zone capital city Durame to the north direction. It is bordered on south by Kacha Bira district, on the north by the Hadiya zone, on the east by Damboya and Kedida Gamela district and on the west by Deyogena district. The total area of the district is around 380.6 square kilometer (CSA, 2007). The temperature ranges from 11^0C-23^0C. Agro-ecologically, the district is classified Dega (high land cover 35%) and Woina Dega (middle land cover 65%) (AWANRO, 2015). According to report of CSA (2021), Angacha district has a total population of 121,447, of which the rural population accounts 81,264 (92.26%), whereas the urban population accounts 6,819 (7.74%). Damboya is one of the seven districts of Kembata Tambaro. The district is divided in to 20 administrative kebeles. Among these 20 kebeles, 17 kebeles are rural and 3 kebeles are urban. The Woreda is bounded by Kedida Gamela district in southern direction, Angacha district in west direction, on north by Hadiya zone and on the east by the Bilate River which separate it from Alaba. The total area of the District is around 18, 318 hectares. It is located at a distance of 324 km south of Addis Ababa, the capital city of Ethiopia, 106 km away from the former regional capital city of Hawassa. Altitude of Damboya district ranges from 1783 to 2503 meter above sea level (m.a.s.l). The annual rainfall ranges between 700-1200 mm and temperature 26°C-22°c. The district has two climatic Zones namely 30% is highland ("*Dega*") and 70% mid altitude ("*Woina dega*"). According to report of CSA (2021), Damboya district has a total population of 82,622, of which the rural population accounts 116,126 (90.17%), whereas the urban population accounts 8,122 (9.83%).

Sampling Method and Sample Size Determination

For this study, Multi-stage sampling technique was used to select representative sample respondents. In the first stage, the two districts were selected purposively on the basis of poultry production potential and accessibility (KTZOLFR, 2019). In the second stage, the six kebeles in the districts was stratified into two agro-ecologies: high land and mid land with thirteen and twenty-one rural kebeles, respectively. In the third stage, the six kebeles from the two districts (3 from highland and 3 from mid land) was selected purposively from each stratum based on the number of poultry holder, potential area for poultry production and abundance of egg layers. Accordingly, from Angacha district from highland agro-ecology 2 kebeles and from midland agro-ecology 1 kebele and from Damboya district from high land agro-ecology 1 kebele and from midland agro-ecology 2 kebeles were selected. Finally, a total of 186 respondents were selected by using simple random sampling techniques from the total poultry owner (2046) of the selected kebeles. The total number of poultry owner living in the two districts have registered about 2046 households; from this total number of poultry owner in

Angacha district is 990 whereas in Damboya district is 1056. Accordingly, 60 and 30 poultry owners from Angacha district was selected from high and medium land respectively. From Damboya district 24 and 72 poultry owners was selected from high and medium land, respectively as it is indicated below in Table 1. This determination was based on (Pandey and Verma (2008), proportional sample size determination formula. Determining sample size in each agro-ecology and Kebele was proportional to entire population of households. proportional to entire population of households.

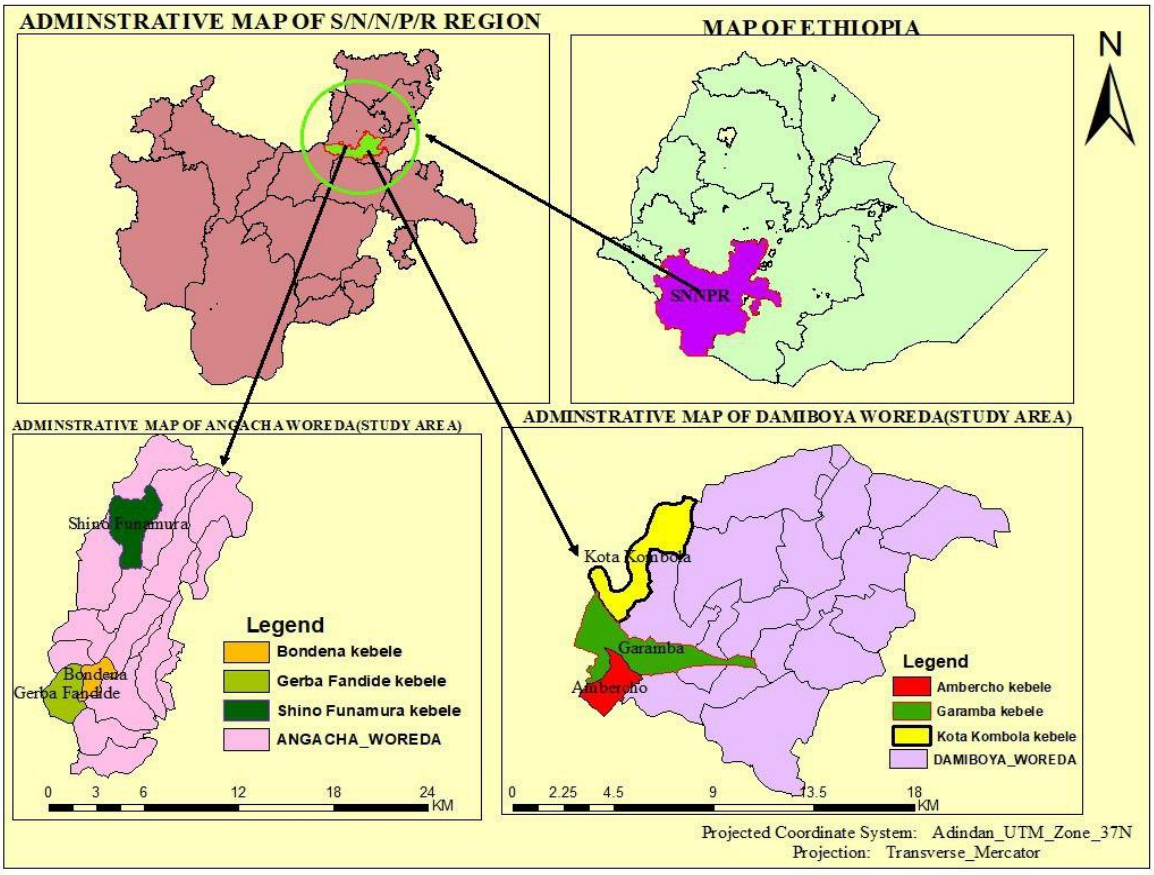

Figure 1: Location map of the study area

Sample size determination

The sample size determination was computed by using Yamane (1967) at 7% level of precision.

$$n = \frac{N}{1+N(e)^2}$$ ----------Yamane (1967)

n= 2046 =2046/11.0352 = 186
1+2046(0.07)^2

Where,
n= the sample size
N = the population size (total chicken owner)
e = the level of precision i.e. 7 %

In general, a total of 186 households from the two districts was selected for this study. After determining total sample size from the districts, selection of chicken owner from each agro-ecology and kebeles was based on the proportion of population. To do this the following formula will be used.

$$n1 = \frac{n * N1}{N} \quad \text{And} \quad n2 = \frac{n * N2}{N}$$ …. (Pandey and Verma, 2008)

Where,
n1 and n2 = is sample size of respondent in each agro-ecology
N1 and N2 = is total number of households in each agro-ecology
n= total sample size of respondent in two agro ecology
N = is total number of chicken owner in the study area

The total numbers of chicken holder house hold existing in the selected kebele of study areas were registered about 2046 households; from this total number of chicken owner 186 were used as sample respondents. From this sample 84 and 102 was from high land and mid land, respectively.

Data Source and Methods of Collection

Both primary and secondary data were used to achieve the objectives of the study. Primary data was included semi-structured questionnaire interviews with key informants, focus group discussions (FGD), household survey and direct observations. FGD was held to triangulate and support the household survey data. FGD was held on the chicken production system, performance and constraints for chicken production. In each Kebele of the two study districts, one FGD including 6-8 members were held with selected knowledgeable local community members. FGD member was Kebele leader, elders, model farmers and women leader at the Kebele. Also, key informant interviews conducted with extension workers. Secondary data collected from different published and unpublished sources such as districts agricultural offices, zonal Agricultural and Rural Development office, Fishery and livestock resource office, regional Bureau, NGOs, Internet, and other published and unpublished materials. The information collected through household survey was includes household characteristics (sex, age, family size, education level), chicken production objectives (purposes), chicken type (local, exotic, cross breed), ownership pattern (household member owning the chicken), production systems (feeding, housing), disease control, flock size, flock performances (clutch cycle per year, age at first egg, egg per year, egg per clutch, number of eggs incubated, number of eggs hatched), current status of laying chickens, constraints of poultry production and opportunities for improving poultry production in the study area using well-structured questionnaires.

Data Management and *Statistical Analysis*

The survey data was entered and organized in to Microsoft Excel, analyzed using Statistical Package for Social Sciences version 26 (SPSS, 2007). Descriptive statistics such as frequency, means, percentages, and standard error of the means was employed in order to have a summary description of the data collected from 186 households' response.

RESULT AND DISCUSSION

Flock Structure

Flock size and structure

The result of the mean flock size of village chicken per household in the study area is shown in Table1 below. The mean flock size in the study areas was 2.94±0.2. From the flock structure highest number was chicks and the second one was hens (Figure 5). The result agreed with the findings of Yared *et al.* (2019) which stated that in Bishoftu (Ethiopia) flocks were, 36.5% reared chicks while hens were the largest flock type followed by pullets, chicks, cockerels, and cocks, respectively and Wondu *et al.* (2013) who stated that in Northern Gonder (Ethiopia) flocks were dominated by chicks (47.0%), hen (20.2%), cocks (9.5%), pullets (14.8%), and cockerels (8.5%). The present study was in line with reported by Mammo (2006) from Jamma woreda (2±0.04) of northern Ethiopia. Similarly, Sonaiya and Swan (2004) stated that most common flock size of family poultry ranging from 5 to 15 birds seems to be the limit that can be kept by a family without special inputs in terms of feeding, housing and labor.

Table 1: Flock size

Agro-ecology	μ±SE	Overall (μ±SE)	(χ2)	P-value
Highland	2.93±0.18	2.94±0.2	15.51	0.999
Mid-land	2.95±0.22			

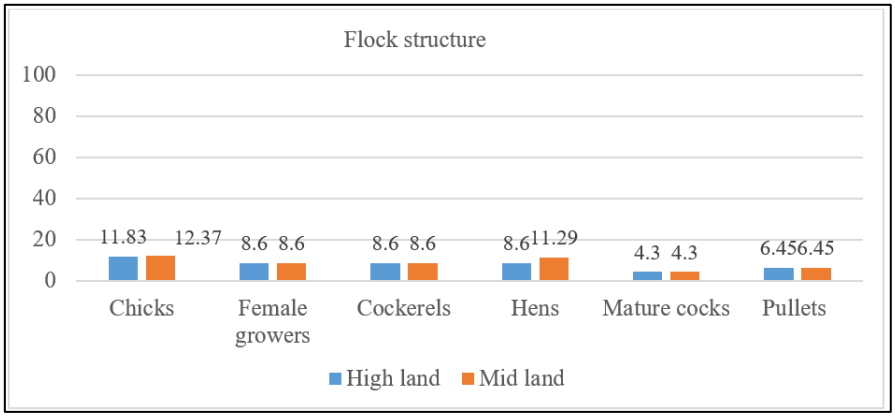

Figure 2: flock structure of the study area

Flock productivity

The result of eggs per clutch per hen, age at first lay (AFL months), age of sexual maturity and number of clutches per hen/year was described on Table 2. The overall mean number of eggs per clutches was (15.82±0.55) and was not significantly different across the agro ecology. According to the respondents, the average age at first lay of village chicken was (6.40±0.47) and was not significantly different across study agro ecology. The Overall mean number of

clutches per hen per year was (5.26±0.25) and was not significantly different across the study agro ecology. The average number of egg production per hen per year 60.4 obtained in this study was similar with 60 eggs per year reported in Bure district by Moges *et al* (2010). The study result was in line with Mammo (2006) who reported that eggs per clutch per hen (15.4±0.4) and age at first lay (5.35±0.7) months from Jimma woreda (Ethiopia). Similarly, Tadelle and Ogle (2001) stated that the average age at first lay in local birds was 6.5 ± 0.93 months which was similar to age at first lay in the Central Highlands of Ethiopia.

Table 2: Eggs per clutch per hen, Age at first lay (AFL months), Age of sexual Maturity, and number of clutches per hen/year

	Agro ecology		
Parameters	**Highland**	**Midland**	**Overall**
Eggs/clutch	15.77±0.47	15.87±0.62	15.82±0.55
Clutches/ hen/year	5.13±0.25	5. 39±0.25	5.26±0.25
Total Egg/hen /year	59.7±10.8	61.1±11.6	60.4±11.2
Age at first laying	6.43±0.44	6.37±0.50	6.40±0.47
Age of sexual Maturity			
Male	7.46±0.313	7.89±0.299	7.67±0.306

Breed composition

The breed composition was presented in Table 3. The chicken populations of the all study agro ecology were dominated by hybrid with having of the percentage of 59.6% (Figure 3), despite the fact that the Agricultural Office of the both agro ecology was said to be involved in the distribution of hybrid chickens. The results of this study showed that indigenous chickens make up about 20.5% of the total chicken population of the overall study areas. The remaining 19.9% of the total chicken population of the study areas are assumed to cross breed. The study results of this study clearly showed that there has been intensive distribution hybrid in the study agro ecological areas. This result of the study in comparable with result of Mamo (2006) which states that (0.2 ± 0.04), Tesfu *et al.* (2006), was the breed composition of the flock was local ecotypes (7.43 ± 0.05) from Jamma and Dire Dawa town (Ethiopia), respectively.

Table 3: Breed composition

	Breed composition		
Agro ecology	**Local**	**hybrid**	**Cross breed**
High land	0.210±0.074a	4.43±0.535b	0.43±0.278a
Mid land	0.55±0.157a	6.27±0.792a	1.67±0.503a
Over all	0.38±0.115	5.35±0.66	1.05±0.38

Chicken Production System

The chicken production system in study area (agro ecology) was presented (Figure 3). The most dominant (93.9 and 94.3%) chicken production system was identified in the study areas were a village chicken production system, semi-intensive (5.3 and 5.4%), and with (0.8 and 0.3%) of intensive for High land and Mid-land agro ecology, respectively. This study was in line with Kitalyi (1998), Sonaiya (1990); Sonaiya and Swan, 2004) which reported that the most dominating poultry production system in rural areas of Africa is extensive system and relying on scavenging feeding systems. Many African countries produce chicken through village production system (Aboe *et al*. (2006), Gondwe *et al*. (2007) and Harrison *et al.* (2010). The village chicken production system is characterized by extensive scavenging, no immunization programs, high prevalence of disease and predators, and uncontrolled natural mating and hatching of eggs using broody hens Dana *et al.* (2010).

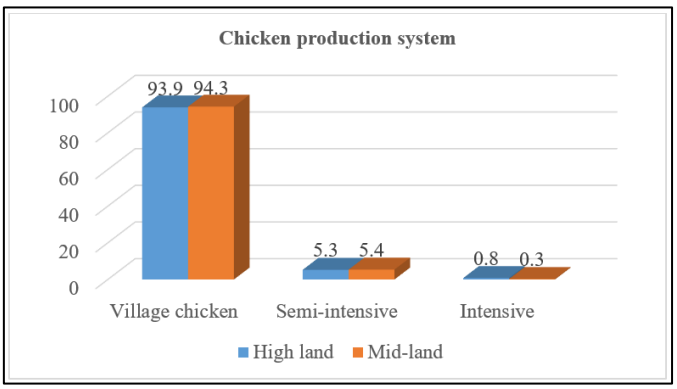

Figure 3: Chicken production system of study area

Village Chicken Husbandry practice

Chicken housing practices

The chicken housing practices in the study areas were shown in Table 8 and Appendix table 7. About 50.55% of the respondents' keep poultry in Perch at one corner in common house which might be due to low priority given to chicken production as compared to other livestock production activity, small flock size, lack of awareness on the importance of housing and risk of predators. On the other side 7.71% of household had Partition with / without perch in the house, 3.38% had Separate house for chicken, 11.61% had a different shelter for night only and 26.75% Share the same room with family over the study agro ecology. This report agrees with the report of (Mebagebriael and Gebrehiwot, 2020) who reported that the majority of farmers were housed their chickens by sharing the same room with perch 65%. Dwigeretal (2003), who reported that village chicken's mortality accounts due to predators because of lack of proper housing.

Table 4: Chicken housing practices in the study areas

Housing	Highland	Mid land	Overall
Perch at one corner in Common house	49.7	51.25	50.55
Partition with / without perch in the house	8.32	7.17	7.71
Share the same room with family and Livestock	25.65	28.34	26.75
Separate house for chicken	2.94	3.82	3.38
Have a different shelter for night only	10.61	12.6	11.61

Feeding and watering

The chicken feeding and watering practices in the study areas as indicated by the respondents are summarized in Table 5. The feed sources in the study area were, 74, 22 and 3.3% of the respondents of highland depended on household food leftover, grain and kitchen wastes, respectively. About 75.4, 22.4 and 2.2% of the respondents of Mid-land depended on household food leftover, grain and kitchen wastes, respectively. This result seems to be in line with that of Meseret (2010) who reported that cereal grains (maize and sorghum) and household scraps are the major supplementary feeds offered, the amount of each being dependent on seasons of the year and the quantity and availability of the resources at the household level, Tadelle (1996) and Maphosa *et al.* (2004) who stated that village chickens don't receive regular and enough supplements. The major source of water for chicken was river at both Highland (93.3%) and Mid-land (94.3%). About 3.5, 11.2 and 85.3% of the overall respondents supplement their chicken twice, free access and once a day respectively in Highland. About 1.5, 8.3 and 90.5% of the overall respondents supplement their chicken twice, free access and once a day respectively in Mid-land. The most predominate watering frequency were once/day of Highland (85.3%) and Mid-land (90.3%). This is agreed with the study of Menegesha *et al.* (2011) in Jamma district (Ethiopia) and Moges *et al*. (2010) in Burie district of North West Ethiopia.

Table 5: Chicken feeding and watering practices in the study areas

	Agro ecology		
Feed sources	**High land (%)**	**Mid-land (%)**	**Overall (%)**
Households food leftovers	74%	75.4%	74.7%
Grains	22%	22.4%	22.2%
Kitchen wastes	3.3%	2.2%	2.85%
Provision time of feed			
Morning	10.2%	8.4%	9.3%
After noon	78%	81.3%	79.65%
Evening	11.8%	10.3%	11.05%
Water source			
River	93.3%	94.3%	93.8%
Pipe Water	0.5%	0.3%	0.4%
Borehole Water	6.2%	5.4%	5.8%
Frequency of Watering			
Free access	11.2%	8.3%	9.75%
Two times/day	3.5%	1.5%	2.5%
Once/day	85.3%	90.2%	87.75%

Disease Prevention and predator control

The disease and predator controlling and treating measures practiced by households are shown in Tables 6 and Figure 5. Prevention measures taken by households to minimize losses due to disease and predator were the same across the study areas (P=2.30) and $\chi 2$=0.184 (Appendix table 10). Around 45.70% of respondent were practicing isolation of sick birds from healthy to prevent disease transmission to other flock of chickens in the study areas. Moreover, around 27.42% of

the respondent households were slaughtering of chickens immediately before sickness to minimize chicken losses due to diseases. On the other hand, around 18.3% of the respondent households did not take any measures as to prevent disease risk on chickens. Only 8.60% of the respondent households were treat the diseases outbreak by using traditional methods (Figure 8). About 63.4, 47.3 and 45.2% of the respondents uses feeding mixtures of garlic with food, plugging of feather, piercing of the blood vessel for bleeding, respectively while 44.1% of respondents were used fumigation the infected chicken with leaves. Using modern medicine, in the study districts were lower because of lower veterinary infrastructure and lack of awareness and adaptability across the study agro ecology. The most commonly used measure against predator control in the study areas were protecting of the chicken house (59.1%), Hanging frustrating materials on fences (51.6%), Growing of hedges (49.5%), Killing of predators (39.8%). This is in line with the reports of Mammo, (2006) (Jamma woreda, south Wollo, Ethiopia), who reported that about 77.70% of the households were using different means of protecting chickens from predators, and Tadelle and Ogle, (2001) (Central Highlands of Ethiopia) who reported that housing played a major role in decreasing mortality of chicken due to reduce predations.

Table 6: Disease Prevention methods and Measure against predator in the study areas

Disease Prevention methods	**High land n (%)**	**Mid-land n (%)**	**Overall (%)**
Plugging of feather	32(35.5)	11(11.8)	23.65
Feeding mixtures of garlic with food	38(41.9)	21(21.5)	31.7
Piercing of the blood vessel for bleeding	11(11.8)	32(33.3)	22.6
Fumigation with leaves	10(10.8)	32(33.3)	22.05
Measure against predator	n (%)	n (%)	(%)
Protecting of the chicken house	27(30.1)	28(29.0)	29.55
Hanging frustrating materials on fences	26(28.5)	22(23.1)	25.8
Growing of hedges	20(22.6)	26(26.9)	24.75
Killing of predators	17(18.8)	20(21.0)	19.9

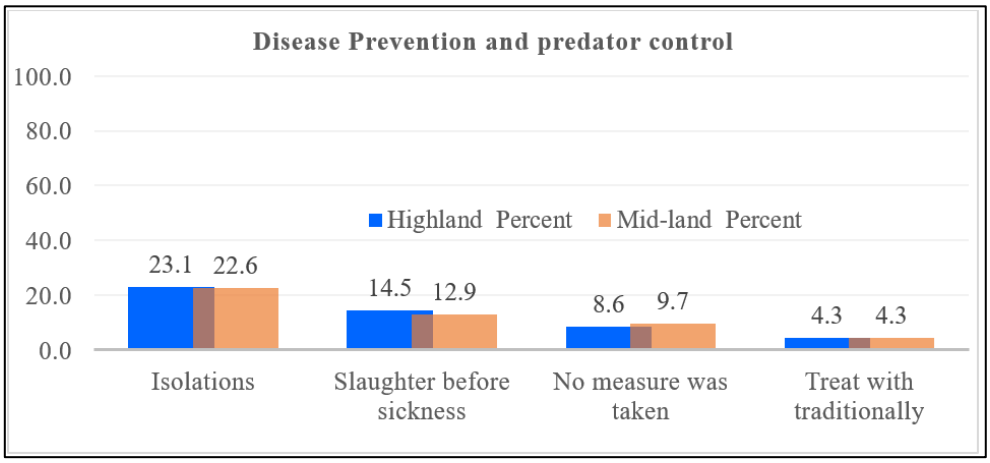

Figure 4: disease prevention and predator control

Production and Reproduction Performance

Egg hatchability

The study finding of the eggs incubated, hatched and hatchability percentages are shown in Table 7. The overall mean of eggs incubated, hatched and hatchability of percentages were (14.8±0.55, 12.5±0.57 and 80.5), respectively. This study finding were in line with the reports of Islam *et al.* (2002) agreed the present study on different breeds of poultry that with 78% of hatchability of eggs, eggs incubated (15.5±0.45) and hatched (13.5±0.47). According to Sonaiya and Swan (2004), hatchability using broody hen around 80% to be normal, but a range of 75% to 80% is considered to be satisfactory. However, Tadelle *et al.* (2003) report in Ethiopia lower (70.5±10%) result of hatchability. Udo *et al.* (2001) and Tadelle *et al.* (2003) report in Ethiopia indicated that the average number of eggs set for incubation per hen was around 14 and 13±0.19, respectively. The overall mean age of sexual maturity for male and female were 7.67±0.306 and 8.13±0.301 across the study agro ecology, respectively.

Table 7: Eggs incubated, hatched, hatchability and Age at sexual maturity in the study areas

Parameters	Highland	Mid land	Overall
Eggs incubated	15.1±0.58	13.87±0.52	14.48±0.55
Eggs hatched	12.13±0.51	11.97±0.63	12.5±0.57
Hatchability	80	81	80.5
Age of sexual Maturity			
Female	8.33±0.291	7.93±0.311	8.13±0.301
Male	7.46±0.313	7.89±0.299	7.67±0.306

Purpose of Keeping Poultry

The study finding revealed that about 40.32, 26.2 and 17.32% of the respondent's rear chicken for sale, home consumption and non-defined purpose respectively (Figure 5). From this most of the respondent householder farmers in the study areas gives highest priority for selling and household home consumption. In line with this result Mammo (2006) who reported that for home consumption and selling (44.7 and 46.8%), from Jamma woreda (Ethiopia). Matiwos (2012) reported that about 50 and 27% of the respondents keep poultry as source of family income and food respectively, from Nole Kabba Woreda (Ethiopia).

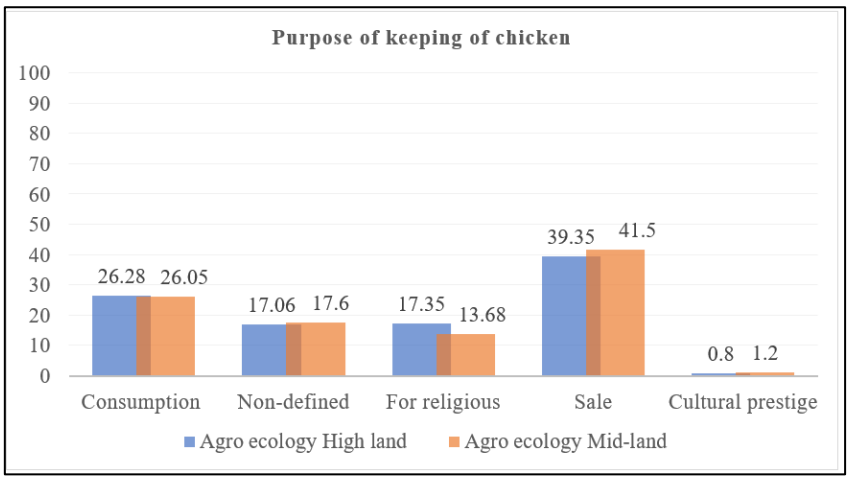

Figure 5: Purpose of keeping of chicken

Village Chicken Management Practices

Egg utilization

The egg utilization practices of the respondents in the study areas were shown below on Appendix Table 8 and Figure 10. There is no significant deference among the study agro ecology ($\chi 2$) =7.6 and P=0.94). The highest percentage of the interviewed household respondent's utilization of eggs were for selling purpose in mid-land (30.1%) and high land (31.7%), with having (61.8%) from the study population. While in high land (10.2%) and mid-land (10.8) utilize the eggs for household home consumption, high land (5.9%) and mid-land (5.4%) for gift purpose and the rest for incubation purpose, respectively. This result was agreed with the report of (Mammo, 2006), from Jamma (Ethiopia) in which farmers were utilize the eggs for consumption (32.2%) and selling (28.4%).

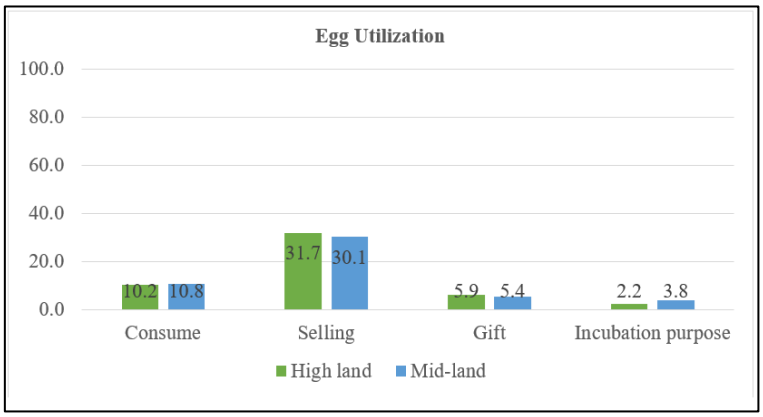

Figure 6: Egg utilization practices in the study areas

Methods of breaking broodiness

The methods of breaking broodiness of chicken in the study areas were shown below on Appendix Table 9 and Figure 7. From the study result, respondents were break broodiness by hang upsides down the broody hens (22.0 and 23.7%), taking broody hen to neighborhoods (13.4% and 13.4%), replacing the adapted place with other materials (8.6% and 9.6%), and piercing feather' s shank into nostril of the broody hen (4.3% and 4.8%) in mid-land and high land agro-ecology, respectively. This finding was agreed with the reports of Matiwos *et al* (2012) most of the farmers were used to break broodiness of broody hen through hang upsides down the broody hens, taking broody hen to neighborhoods, by replacing the adapted place with other materials, and piercing feather' s shank into nostril of the broody hen from Nole Kabba Woreda (Ethiopia).

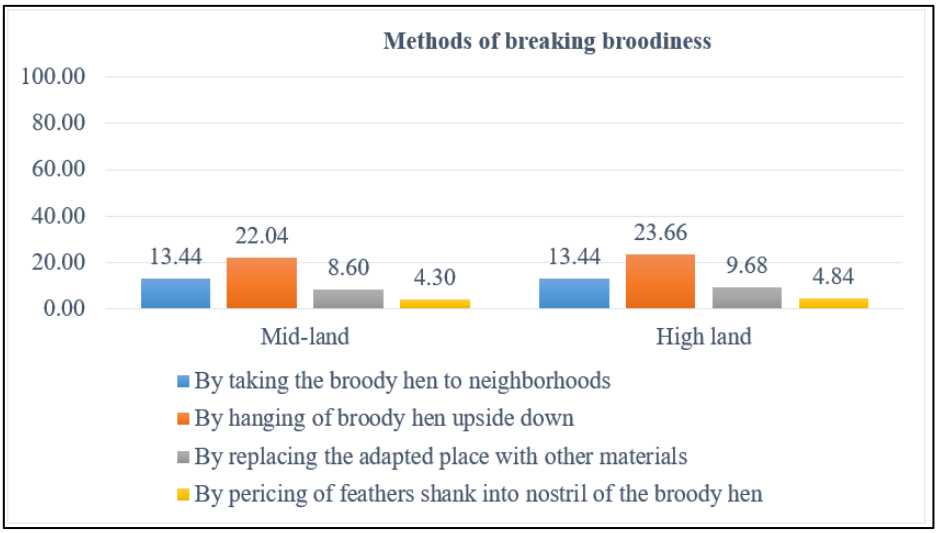

Figure 7: Traditional Methods of breaking broodiness in the study areas

Egg storage condition

The egg storage conditions in the study area were indicated on Figure 9. Study result showed that the respondents were stored egg in cold places (4.3%), inside cold container (18.3%), warm places (6.5%), inside grains (8.6%), any place (8.6%) and cold places covered with clothes (2.2%), in high land agro ecology. While the respondents were stored egg cold places (4.3%), inside cold container (21.5%), warm places (6.5%), inside grains (8.6%), any place (8.6%) and cold places covered with clothes (2.1%) mid-land agro ecology. The finding of current study revealed that, egg storage condition inside cold container in mid land (21.5%) was higher than high land (18.3%). The study finding was in line with the reports of Shiferaw *et al*. (2006) in which more than half of the respondents store their eggs in cold places (under their bed) and inside cold container (like clay pot) while the remaining farmers store their eggs in warm places (on perch where cooking takes place), inside grains and cold places covered with cloths from Selected Zones of Ethiopia.

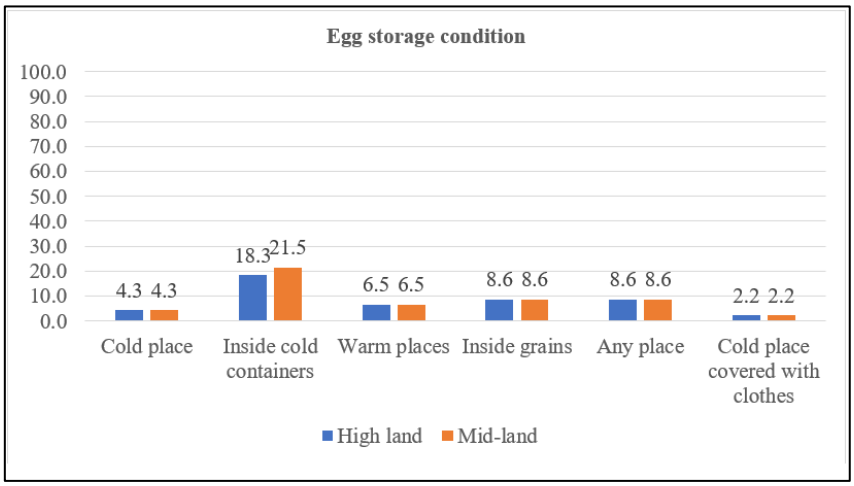

Figure 8: Egg storage condition in the study areas

Setting and bedding material

The egg setting and bedding materials of chicken in study areas were shown on Appendix Table 11 and Figure 9. The different setting and bedding materials used by respondent households were from this clay pot with straw bedding was most preferred by the majority of the respondents followed by sac and straw bedding with percentage value of 16.1% (High land), 14.0% (Mid-land) and 12.0% (Highland), 14.0% (Mid-land), respectively. This result agreed with the reports of Shiferaw *et al* (2006) from Selected Zones of Ethiopia in which clay pot with straw bedding is most preferred by the majority of the respondents (15.9 %) followed by cartoon and bamboo basket with straw bedding (12.6%). Similarly, Tadelle and Ogle (2001) reported that farmers were used clay pots, cartoons, bamboo basket and even simply depression in the ground in central highlands of Ethiopia. In the same report they also indicated that the bedding materials used in all study villages were crop residues, usually *teff* (*Eragrostic tef)* and wheat straw.

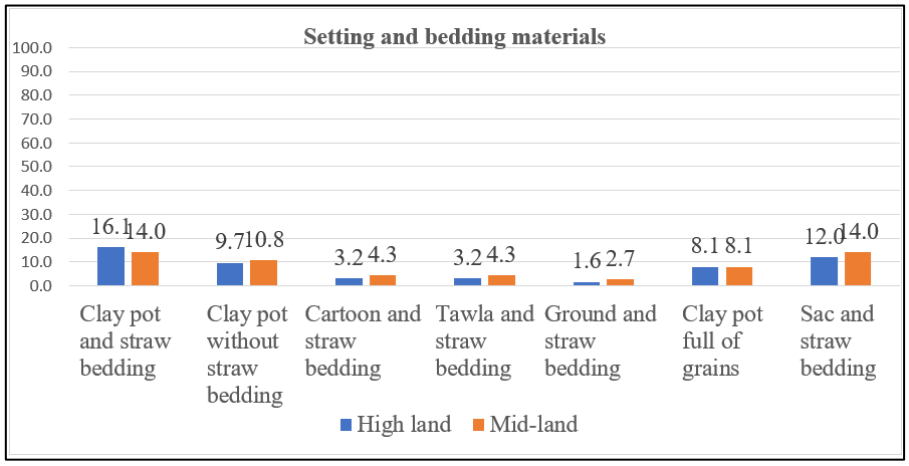

Figure 9: Setting and bedding materials in the study areas

Constraints of Village Chicken Production

The constraints of chicken production prioritized by the respondents in the study areas described on Table 13 and Figure 14. The major constraints of chicken production in the study areas were Prevalence of disease, High chick mortality, Predator attack, Shortage of feed and grains and Lack of parent stock. Constraints were not different from those reported by others in Ethiopia such as Solomon (2007) who reported that the main constraint of traditional chicken production system was disease at Jimma (Ethiopia). The most prevalent and economically important disease that attacks chicken population specifically Newcastle disease which is locally known as "*Kenbesha* (Pronounced as '*Keen.bee.sha'*)" in the study areas. The second and third major constraints were high chicken mortality and predator attack, respectively, this might be because of poor housing system, and free scavenging feeding. Among predators like baboons, and wild cat which is locally known as ("*shululla"*) were more predominated one in the study areas. The finding of study were in line with Bosenu and Takele (2014) who reported about 70% of the respondents were ranked disease as the most important constraint to rural poultry production in Haramaya District (Ethiopia), Tesfu *et al* (2006) who ranked predation and disease as the major problem of chicken production in Dire Dawa town (Ethiopia) and Melkamu (2013) who reported that predator, feed shortage, flock mortality and low production as first, second, third and fourth constraints, respectively at Gonder Zuria Woreda (Ethiopia).

Table 10: Relative index for Chicken Production Constraints in the study area (agro ecology)

	Relative degree of importance of both agro ecology						
Major constraints	**1**	**2**	**3**	**4**	**5**	**Index**	**Rank**
Prevalence of disease	104	34	68	39	52	0.342	1st
High chick mortality	64	21	42	52	5	0.221	2nd
Predator Attack	40	13	26	35	0	0.138	3rd
Shortage of feed and grains	24	8	16	10	11	0.080	4th
Lack of parent stock	16	5	10	11	3	0.054	5th
Poor hatchability	10	3	9	8	10	0.040	6th
Spoilage of eggs	11	5	2	3	1	0.030	7th
Poor extension services	8	6	3	7	0	0.030	8th
Lack of veterinary service/vaccination	9	4	3	5	1	0.028	9th
Inadequate equipment	8	2	4	5	2	0.025	10th

Opportunities of chicken production

The opportunity of chicken production the study areas were presented in Table 11. From the study result revealed that the three major opportunities are market access, credit services and payment for social gathering, respectively.

Table 11: Opportunity chicken production in the study agro ecology areas

Opportunities	Relative degree of importance			Index	Rank
	1	2	3		
Market access	22	14	10	0.3363	1st
Credit services	8	18	7	0.2221	2nd
Payment for social gathering	5	11	17	0.1915	3rd
Child malnutrition	4	13	11	0.1593	4th
Youth and women's empowerment	7	8	5	0.0977	5th

CONCLUSION AND RECOMMENDATIONS

The mean of Eggs per clutch per hen, Age at first lay (AFL months), and number of clutches per hen/year were 15.82±0.54, 7.08±0.25, 6.4±0.47 and Age of sexual Maturity *of* Male=7.67±0.306, respectively. The most predominate one is hybrid breed with having of the percentage of 60%. 84.95% of the respondents' households keep poultry in Perch at one corner in common house, 45.70% respondent households from were practicing of isolation of sick birds from healthy to prevent disease transmission to other flock of chickens. The overall mean of eggs incubated, hatched and hatchability of percentages were (14.5±0.55, 12.5±0.57 and 80.5), respectively. The study finding revealed that about 40.86, 26.34 and 16.67% of the respondent's rear chicken for sale, home consumption and non-defined purpose respectively. Most of house holds utilize eggs for selling purpose Mid-land (30.1%) and High land (31.7%), with having (61.8%) from the study population. While in Highland (10.2%) and Mid-land (10.8%) utilize the eggs for household home consumption, Highland (5.9%) and Mid-land (5.4%) for gift purpose and the rest for incubation purpose, respectively. From the study result 22.0% and 23,7% hang upsides down the broody hens, 13.4% and 23,6% taking broody hen to neighborhoods, 8.6% and 9.6% by replacing the adapted place with other materials, and 4.3% and 4.8% piercing feather' s shank into nostril of the broody hen, for highland agro ecology, respectively. About 4.3% cold places, 18.3% inside cold container, 6.5% warm places, 8.6% inside grains, 8.6% any place and 2.2% cold places covered with clothes, of Mid-land agro ecology, respectively. 4.3% cold places, 21.5% inside cold container, 6.5% warm places, 8.6% inside grains, 8.6% any place and 2.1%cold places covered with clothes highland agro ecology, respectively. The most prevalent and economically important disease that attacks chicken population specifically Newcastle disease which is locally known as "*Kenbesha* (Pronounced as '*Keen.bee.sha'*)" in the study areas. The second and three major constraints were high chicken mortality and predator attack, respectively. This might be because of poor housing system, and free scavenging feeding. Among predators like baboons, and wild cat (locally known as "*shululla"*) were more predominated one in the study areas.

On the basis of the above conclusion the following was recommended:

- Efforts should be geared to alleviate constraints like disease outbreak, High chick mortality, and Predator attack, Shortage of feed and grains and Lack of parent stock hampering chicken production in the study districts.
- Training of smallholder farmers on chicken housing practices in the study areas

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