



(RESEARCH ARTICLE)



Assessment of chicken husbandry practices in selected districts of Gamo zone, Southern Nation Nationality and Peoples Region, Ethiopia

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Abstract

The study was conducted in two districts of Gamo zone, with the objective of describing poultry husbandry practices in the study area. A total of 120 indigenous chicken owning farmers for survey were considered in this study. Descriptive statistics, frequency procedures, general linear model, were used with SPSS version 20 to analyze the data. The study further indicated that improved (formulated) feed utilization is not practiced in the study area; the nutritional management practices were scavenging (main practice) and supplementary feeding. The common poultry feeds identified at the study area were: maize (100%), wheat (27.4%), sorghum (16.5) and leftovers (100%). According to feed source 38.6%, and 61.4% of the respondent's gate supplementary feed material from purchasing and household. Almost all of the respondents in three districts provide water for their chickens. The survey indicated that almost all farmers provided night shelter for their chickens; the principal causes of chicken loss in the study area were reported to be diseases (56.1%) and predators (43.9%). The result of this study revealed that the purpose of rearing chicken in the study area was primarily for cash income through selling of chicken and egg and for home consumption. The average chicken owned per household was 15.40 ± 1.24 . The average age at sexual maturity for male and female chicken was 6.25 ± 0.55 and 6.25 ± 0.55 months, respectively. The number of clutch per hen per year, eggs per clutch and total eggs produced per hen per year were 3.66 ± 0.97 , 17.34 ± 3.36 and 50.46 ± 10.64 eggs, respectively. Disease and predator were the major constraints in the study areas.

Keywords: Chicken; Husbandry; Feeding; Watering; Housing

1. Introduction

In Ethiopia, agriculture contributes 40-50% of the gross domestic product (GDP), over 90% of the foreign exchange earnings and about 85-90% of employment opportunities in the country (1). The majority of agricultural output is generated from crop and livestock integrated production systems. The livestock subsector contributes about 16.5% of the national Gross Domestic Product (GDP) and 35.6% of the agricultural GDP (2). Ethiopia is a home for many livestock species and suitable for livestock production. It is believed to have the largest livestock population in Africa. An estimate indicates that the country is a home for about 56.7 million cattle, 29.33 million sheep, 29.11 million goats, 2.03 million horses, 7.43 million donkeys, 0.4 million mules and 1.16 million camels (3).

Poultry population is estimated to be about 56.53million, including cocks, cockerels, pullets, laying hens, non-laying hens and chicks. Most of the poultry are chicks (41.35 percent), followed by laying hens (32.18 percent). Pullets are estimated to be about 5.85 million in the country. Cocks and cockerels are also estimated separately, and are 5.32 million and about 3.11 million, respectively. The others are non-laying hens that make up about 2.53 percent (1.51 million) of the total poultry population in the country. With regard to breed, 94.31 percent, 3.21 percent and 2.49 percent of the total poultry were reported to be indigenous, hybrid and exotic, respectively. SNNP region contributes 19 percent of the

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total chicken population in the country. Within the SNNP region majority of the chickens are found in the Gamo zone by following the Sidama zone (4). The majority of the national poultry population (41.35%) is baby chicks characterized by extremely high mortality.

In Ethiopia poultry production is an important part of the mixed crop-livestock farming system and practiced by most households. Whereas it makes a vital function through the provision of meat and eggs for home consumption and for the generation of cash income through market exchange (5). The sector in the country can be characterized into three major production systems based on some selected parameters such as breed, flock size, housing, feed, health, technology, and bio-security. These are village or backyard, small scale commercial and large scale commercial poultry production system (6).

Animal production in general and poultry production in particular plays important socioeconomic roles in developing countries. The ability of poultry to adapt to most areas of the world, their rapid growth rate, fast reproduction rate compared to most other livestock or the rapid generation time, a simple means of generating family income and employment opportunities and raised with relatively low capital investment and readily available household labor compared to other domestic animals all make poultry an ideal starting point for beginning production and for family use as a rich source of animal food for human being (7).

In smallholder poultry production systems housing is rudimentary and mostly built with locally available materials. Study by (8) in Jamma district, South Wollo zone reported that 41.3 and 21.2% of chicken owners share the same room with the chickens in the night and provided separate poultry house, respectively. Chickens living with the owners in the night may be liable for zoonotic disease and it could be one of the causes for high mortality in traditional poultry production system.

In Ethiopia, disease and predators are known to be the major causes of chicken mortality (9). A study on the losses of chicks in Tanzania shows, naturally brood flocks showed that up to 50% of chicks are lost during the first 8 weeks. Thus, despite the multiple causes of losses encountered in free range local chickens quantitative study of the causes and their contribution to losses in the flocks have not been established (10).

In Ethiopia live chickens and eggs are sold throughout the year. Whereas, the prices of chickens are influenced by phenotypic natures of chickens, seasons and holidays. Site (the market and road accessibility in particular), phenotypic nature of an animals, seasons and holydays in general play an important role for the variations of chicken prices (11; 12).

Nutrition is critical in increasing egg and meat production in scavenging chickens. There is ample evidence to show that if indigenous chickens are given sufficient feed, production increases substantially (13; 14). Roberts (13) suggested that the chicken population and yield are determined by the scavenging feed resource base (SFRB). Production of protein through the farming of earth worms and insect larvae can be undertaken at little cost once a suitable system has been established. Since those who keep scavenging chickens are often the poorest of the poor, they cannot afford to purchase supplementary feed. But there are locally available feed sources such as low grade grains, root crops, agro-bi-products and edible seeds obtained with low cost. In addition, availability of clean drinking water may be a constraint to production since intake of feed and consumption of water are closely related.

Quality livestock feed is necessary for the maintenance of physiological functions and animal defense systems against diseases and parasites. Traditionally, feed quality has been specified on basis of the nutritional value of every individual feed component (15). There are also several factors which can affect the expected production of chickens. Among others, lack of knowledge on chicken feed and feeding management is the most critical factor hindering chicken productivity leading to low production level of the sector (8) Therefore, considering the above facts, the present study was designed with the objective of: To describe husbandry practices of indigenous chicken in the study area.

2. Material and methods

2.1. Description of the Study Area

The study was conducted in two districts such as Kucha and Arba minch zuria of Gamo Zone, SNNPR.

Arba Minch Zuria is found 505 km away from Addis Ababa and lies between 6°28' and 6°72'N and 36°38' and 36°42'E latitude and longitude ranges, respectively. The district is characterized mostly by flat and undulating land features with an altitude ranging from 1001 up to 3480 m.a.s.l and minimum and maximum temperature 13°C and 28°C, respectively;

while average annual rainfall is 800-1700 mm/year. The major town in this district is Arba minch. The district is bordered on the south by the Dirashe woreda, on the west by Bonke, on the north by Dita and Chench, on the northeast by Mirab Abaya, on the east by the Oromia Region, and on the southeast by the Amaro special woreda. This woreda also includes portions of two lakes and their islands, Abaya and Chamo, Nechisar National Park is located between these lakes. (Arba Mich Zuria District Agricultural office, 2018).

Kucha is 172 km far from Arbaminch (the capital of Gamo zone) and 563km from Addis Ababa and lies between 5°57' and 6°26'N and 36°99' and 37°32'E latitude and longitude ranges, respectively. The district is characterized with an altitude ranging from 501 up to 2500 m.a.s.l and minimum and maximum temperature 17.6 °C and 27.5 °C, respectively; while average annual rainfall is 1500 mm/year. The major town in this district is Selambers. The district is bordered on the south by Dita and Deramalo, on the southwest by Zala, on the west by Demba Gofa, on the northwest by the Dawro Zone, on the north by the Wolayita Zone, on the east by Boreda, and on the southeast by Chench. (Kucha District Agricultural office, 2018).

2.2. Study Design

A cross sectional study design was employed by using semi structured questioner survey and direct observation to assess Marketing and Market Problems, Source of foundation and replacement stocks, Cultural and religious taboos, Production and Reproduction Characteristics , Major Constraints of Poultry Production, poultry feed resources and feeding and watering system under smallholder farmers in Arba minch zuria and Kucha districts.

2.3. Method of Data Collection and Sources of Data

Both primary and secondary data were collected following qualitative and quantitative research methodologies involving surveys, focus group discussions and farm visits. Descriptions of the methods are presented in the subsequent sub-sections.

2.3.1. Questionnaire survey

Household level data and feed types were collected employing questionnaires. The questionnaires will be pre-tested and readjusted before the actual data collection started. Moreover, field observations on Marketing and Market Problems, Source of foundation and replacement stocks, Cultural and religious taboos, Production and Reproduction Characteristics, Major Constraints of Poultry Production, feed resource type, and feeding practice, will be an important component of the study process. The contents of the questionnaires focused primarily on poultry feed resources and feeding practices in the study areas.

2.3.2. Focus group discussions

Group discussions consisting of 9-11 participants were conducted. The group discussions involved 1 group in each kebeles and the researcher facilitated the discussions at all sites. The main points for discussion included availability of feed resources and their relative abundance over time, major constraints and possible options.

2.3.3. Field level observation

During the questionnaire administration, poultry feed resource, Feed provision and feeding practice, Seasons of feed resource availability, Water provision and watering practice, the practice of feeding homemade ration for chicken based on age and purpose of production were observed. For this study, 2 kebeles of Arbaminch zuria district, 2 kebeles from Kucha district were randomly selected. A total of 120 farmers (thirty farmers from each kebeles) were selected purposively.

2.4. Data analyses

The Collected data was stored into Microsoft excel spreadsheet and analyzed using SPSS version 20. Descriptive statistics were used for describing management practices in each intensive farms.

3. Results and discussion

3.1. Socio-Economic Characteristics of Respondents

Socio-economic features of the respondents are indicated in Table 1. In the study area religions of the respondents were classified as 69% protestant, where as 25.7% orthodox and the remaining 5.3% were Muslim. The survey results

indicate that keeping of chicken was widely practiced in the study areas. From the total interviewed village chicken owners, 72.4 and 65% were female in Kucha and Arba minch zuria districts; respectively. The higher percentage of female respondents were because of some men were either working in towns and others took domestic animals to grazing areas. The responsibility for chickens is also given for women and children.

Table 1 Sex, age, family size and education level of the respondents in the study area (in percent and mean \pm SD)

Parameter	Districts		
	Arba minch Zuria (N = 60)	Kucha (N = 60)	Over all (N = 120)
Sex of respondent			
Female	65	72.4	68.7
Male	35	27.6	31.3
Age of respondents			
<15 years	31.2	29	30.1
16 – 25	27.5	31.8	29.65
26 – 35	23.4	22.5	22.95
36 – 45	10.3	10.2	10.25
46 – 55	4	4.5	4.25
> 56 years	3.6	2	2.8
Family size			
< 15	2.57 \pm 1.15	2.15 \pm 1.02	2.36 \pm 1.16
16 -25	1.42 \pm 0.88	1.34 \pm 0.74	1.38 \pm 0.96
26- 35	1.08 \pm 0.69	1.25 \pm 0.46	1.16 \pm 0.78
36 – 45	1.03 \pm 0.24	0.32 \pm 0.42	0.67 \pm 0.62
46 -55	0.25 \pm 0.12	0.21 \pm 0.39	0.23 \pm 0.24
> 56	0.21 \pm 0.29	0.18 \pm 0.31	0.19 \pm 0.52
Average family size			
	6.56 \pm 3.22	5.45 \pm 0.15	5.99 \pm 0.18
Education status in			
Illiterate	44.6	53.6	49.1
Read and write	26.4	32.6	29.5
1-8	18.8	9.8	14.3
9 – 12	10.2	4	7.1
Religion of respondent			
Protestant	72.5	65.5	69
Muslim	6.1	4.5	5.3
Orthodox	21.4	30	25.7
Main Job			
Farming(livestock /crop)	86.2	88.6	87.4%
Students	4.5	7.6	6.2%
Daily employer and others	9.3	3.5	6.4%

Numbers in parentheses refer total number of respondents

As indicated in the present study the average family size was 5.84 ± 0.15 and 6.12 ± 0.22 in Kucha and Arba minch zuria districts, respectively which is large. The overall mean family size of sample households was 5.99 persons in the study areas, which is higher than the national average of 4.6 per households. The higher family size in this study might be due to lack of family planning in the study area. The age composition of households typically resembled population pyramid in most developing countries, with the majority of house hold members being children under 14 years for the reason explained above. This result is comparable with reported average family size value of 6.00 in low land of Kersa district by (16).

Results for the position and main job of respondents given in Table 1 revealed that about 92.4 % farmers were fully involved in farming activities as means of their livelihood. The remaining 4.2% were students from that household, 3.4% were daily employers and doing farming activities per time. Regarding educational backgrounds of the respondents 49.1% of interviewed participants did not have any formal education (illiterate), 29.5% read and write, 14.3% through elementary school (1 to 8) and 7.1% high school and preparatory (9 to 12).

3.2. Chicken ownership and management

Table 2 shows the ownerships of indigenous chickens among the members of households. The research results showed that women possess the majority (54.1%) of the chicken in the household followed by daughters and sons. From the result one can understand that keeping the chickens is considered as the role of women's and children in the study areas. Some respondents in the study area respond that keeping the chicken by the adult male is considered as shame and some adult male do not want to keep chickens for this reason. The study (17) conducted on village chicken production in some parts of Nigeria and Cameroon, reported that women own chicken of the household as first rank followed by children and men. This shows that any intervention for chicken improvement should be through women and children.

Table 2 Chicken ownership in the study areas

Districts			
Ownerships (%)	Arbaminch zuria (N=60)	Kucha (N = 60)	Overall (N = 120)
Mother	39.4	35.6	37.5
Father	5.6	11.2	8.4
Daughters	34.9	29.4	32.15
Sons	20.1	23.8	21.95

3.3. Flock composition per households

Table 3 Average chicken flock size and chicken composition per household in the study area (mean \pm SD)

Variables	Districts		
	Arba minch zuria	Kucha	Overall
Hen	4.06 ± 0.04^b	5.21 ± 0.06^a	$4.63 \pm 0.05^*$
Pullet	2.10 ± 0.23^a	1.95 ± 0.21^b	$2.02 \pm 0.22^*$
Cocks	1.30 ± 0.12^b	1.50 ± 0.14^a	$1.40 \pm 0.13^*$
Cockerels	2.01 ± 0.32^a	2.11 ± 0.36^a	2.06 ± 0.34^{ns}
Chicks	5.12 ± 0.42^a	5.45 ± 0.54^a	5.28 ± 0.48^{ns}
Average flock size/HH	14.59 ± 1.06^b	16.22 ± 1.43^a	$15.40 \pm 1.24^*$

^{a,b}, means in a row with different superscript letters denote significant differences between sampling districts ($p < 0.05$); SD = Standard Deviation.

Average chicken flock size and chicken composition per household is shown in Table 3. Although all respondents in the study area kept chickens, the numbers per households varied. Farmers in rural areas do not keep records because they pay little attention to chickens than other livestock. The overall mean flock size per household of chickens was

15.40±1.24. Highest mean number of chicks per household was observed followed by hen, pullets, cockerels, and cocks, respectively. The breeding female hens have larger number in the study areas. This is because farmers most of the time sell male chickens as it fetch more money and keep female chickens for egg production, and to get replacement stock.

3.4. Husbandry Practices of Chickens in the Study Areas

Chicken husbandry practices of the community in the study area are indicated in Table 4. The common production system (100%) practiced in both study district was extensive or the free ranging management systems with only seasonal feed supplementation, where all chickens are left to scavenge during the day time and returned to the house at the night. The feed supplementation is practiced during dry season when the scavenging feed sources become decreased.

Similarly (18) reported that the indigenous chicken production system is characterized with backyard scavenging (100%) with seasonal supplementation of feed (100%) in Southern Tigray, North Ethiopia. Concerning the husbandry practices, majority of interviewed households were agro – pastoralists (keeping livestock with a small farm land for household food consumption). The remaining 22.5% were pure pastoralists those which depends only on the livestock for their livelihoods.

Table 4 Chicken husbandry practices of the community in the study area (in percent)

Parameters	District		
	Arba minch zuria (N=60)	Kucha (N=60)	Overall (N=120)
Types of management			
Extensive/free ranging	100	100	100
Husbandry practices			
Crop- livestock/mixed	82.8	89.4	86.1
Others	17.2	10.6	13.9

3.4.1. Chicken housing in the study area

Poultry housing system of the respondents in the study area is shown in Table 7. Good housing is a precondition for any sustainable poultry production. In rural areas, housing occupies a low priority in managing poultry including chickens under free-range (19) and also housing is necessary to chickens as it protects them against predators, theft, extreme weather (rain, sun heat, cold wind, cold temperatures) and to provide shelter for egg laying and broody hen. However, half of the respondents in Arbaminch zuria and Kucha district respectively had separate house for their chickens. The majority of the respondents indicated that they keep their chicken at various night sheltering places in the main house including perches inside the house and perches in the kitchen. These sites were obviously the most secure overnight locations to avoid predators. However, this may increase the risk of disease transmission. The major reasons for not constructing separate poultry houses in the study areas might be lack of knowledge (because majority of the farmers were illiterate) and risk of predators. The present result is less than the finding of (20) who reported that majority of the rural households kept chicken in prepared separate house as 59 % in Fogera District. Similar with Study (21) conducted in Halaba woreda, southern Ethiopia indicated that there was no chicken house built exclusively for chicken outside the main house. Whereas, a study conducted in Sudan (22) reported that 48.7% of the household provided overnight housing for the birds. (23) reported that 50.77% of farmers kept their chickens outside the main house which is exclusively made for chickens in North western Ethiopia. Other study (24) in south west Shewa explained that almost all of the farmers provide night shelters for their birds. The current study revealed that most of the respondents housing together with chicken in the night, and it causes transmission of zoonotic diseases between human and chicken. The study (25) reported that in some African countries a large proportion of village poultry mortality was accounted due to nocturnal predators because of lack of proper housing.

Table 5 Poultry housing system

Parameters	District		Overall (N=120)
	Arbaminch zuria (N=60)	Kucha (N=60)	
Type of house			
Tree perch in the main house	21.5	31.5	26.5
In the kitchen	24.9	19.6	22.2
Separate chicken house	53.6	48.9	51.3
Type of housing material			
Wood + mud	35.6	41.7	38.6
Wood + grass roof	22.3	25.4	23.8
Wood + iron sheet roof	12.5	9.8	10.8
Bamboo house	29.6	23.1	26.35

3.4.2. Feeding practices

Poultry feeding practices of the respondents in the study area are indicated in Table 8. The major nutritional management in both the study districts were based on scavenging feed resource with some sort of conditional supplementary feeding.

Table 6 Poultry feeding practices in the study districts (in percent)

Parameters	District		Overall (N=120)
	Arba minch zuria (N=60)	Kucha (N=60)	
“Main” source of feed			
Scavenging	93.3	96.4	94.8
From supplementary	4.4	3.6	4
Formulated ration	2.3	-	1.2
Provision of supplementary feed			
Yes	100	100	100
No	-	-	-
Frequency of provision			
Morning	16.7	35.1	25.9
Afternoon	21.5	5.1	13.3
Morning and afternoon	10.1	30.5	20.3
Three times a day	14.3	11.1	12.7
Adlib item	37.4	18.2	27.8
Types of Supplementary feed			
Maize	100	100	100
Wheat	21.3	33.6	27.4
Sorghum	18.9	14.2	16.5
Leftover	100	100	100

Source of supplementary feed			
Purchased	35.1	42.1	38.6
Household	64.9	57.9	61.4
Class of birds receives supplementary feed			
All birds	24.3	31.2	27.8
chicks	31.7	27.8	29.7
Hen	20.4	24.7	22.5
Pullet	13.5	16.3	14.9
Cockerel	10.1	-	5.05
Cock	-	-	-
How to feed			
Put in container	82.5	85.5	84
Throw on the Ground	17.5	14.5	16
Reason for not giving supplementary feeds			
Lack of awareness	21.4	18.5	20
Unavailable	78.6	81.5	80

Percentages do not add up to 100% since feed respondent selected more than one type

The chickens scavenge under trees, family leftover feeds, in cattle and other animals' barns. All of these were full of risk to the chicken. Chicken scavenging under trees and open field were at risk of predators in general to the hawks and cats in particular (26). Besides scavenging, majority of the respondents provided supplementary feed especially during dry season on which feed shortage is critical. But in rainy season as scavenging feed resource is available and farm lands are far from home, supplementary feed is not provided.

All of the respondents who practiced supplementary feeding in dry season were used home grown crops such as maize, wheat, sorghum and household scraps to feed their chickens, This result agrees with study (27), who reported that village chickens usually feed handful grain at the morning and get more of their supplement by scavenging, in India. The result of this study on supplementation is lower than that reported by (23) for northwest Amhara region, who reported 99.3% of the farmers supplied partial supplementation of feeds but higher than the study of (28) who reports 35-63.33%, supplementation of feeds for north shawa zone. Frequent provision of supplemental feed was given in the morning (35.1%) in Kucha, Adlibitum (freely) (37.4%) in Arba mich zuria districts.

Feeding practices thrown on the ground for collective feeding was 84.7 in the study districts. The result of this study was lower than study of (29) 97.2% of the respondents, home grown or purchased supplementary feed materials are offered indiscriminately to all classes of chicken on bare ground in Gomma district, Jimma zone. All of the farmers who practiced supplementary feeding system use home grown crops such as maize, wheat, sorghum and household scraps to feed their chicken. The type of supplemental feeds varied based on the type of agricultural practice and season. Both in Arba minch zuria and Kucha districts there is more provision of maize which is 74.2 and 66.8%, respectively. However, the provision of wheat was higher (48.57%) in Kucha district. Provision of crop variation is because of seasons and agro-ecology diversity. According to feed source 38.6%, and 61.4% of the respondent's gate supplementary feed material from purchasing, and household.

3.4.3. Watering practice

Watering practices in the study districts are indicated in Table 8. All village chicken owners of the study districts provided water to their Chickens year round especially during the dry season. In the rainy season, the amount and frequency of water provided to chicken is lower than that in dry season. This is because surface water is widely available during the rainy season. In this result most chicken producers in all districts, provided water in the morning and afternoon. This result is less than from (23) reported that 99.5% of the chicken owners in north-west Amhara provided water to village birds. The current study revealed that the major sources of water for village chicken in the all study

districts was Tap water, river water and Rain water source. The present study indicated that most chicken owners used plastic troughs for watering chickens followed by broken clay materials and wooden equipment's.

Table 7 Watering practice in the study districts (in percent)

Parameter	District		Overall (N=120)
	Arba minch zuria (N=60)	Kucha (N=60)	
Water provision			
Yes	100	100	100
No	-	-	-
Watering frequency			
Morning	7.8	10.2	9
Afternoon	15.8	28.3	30
Morning and Afternoon	22.4	31.6	27
Evening	11.9	14.3	13.1
Adlibitem	42.1	15.6	28.9
Watering trough			
Broken clay material	21.4	32.6	27
Plastic material	64.5	59.7	62.1
Metal material	14.1	7.7	10.9
Source of water			
River	49.6	62.5	56.05
Pond water	15.2	25.2	20.2
Tap water	35.2	12.3	23.75

3.4.4. Health and Disease Control

Regarding the outbreak of disease in the study districts in one year (12 month) of time the survey results showed that almost all of the interviewed chicken owners in the two districts were able to recognize the occurrence of poultry diseases which were the main causes for the loss of chicken in the area. The result of this study is similar with (16) in east Hararghe in the lowland of Kersa districts also reported that all respondents in the study area revealed the occurrences of diseases among their flocks.

Regarding control measures, 100% of the respondents practiced traditional methods to treat their chicken which was higher than the finding reported by (30) who reported that 12.5% of the respondents in Jamma district of South Wollo practiced traditional treatment to prevent poultry diseases, but it is comparable to the result of (16) who reported that 54.5% of respondents in lowland of Kersa district in east Hararghe zone practiced traditional treatment to prevent poultry diseases.

According to farmers response during group discuss most common ingredients utilized as diseases treatment were Ash, Garlic, Lemon, Butter, Salt, Oil(fat), Ginger and Local plants, pepper, antibiotics such as tetracycline, local alcoholic drink (local name, *arekie*), juice of *Aloe Vera* plant. These all mixed with water and provide for the diseased chicken. For external parasite they use white salt mixing with oil (fat) and kerosene (lamp oil). (31) also reported that traditional treatments against NCD and other diseases and parasites were local alcoholic drink (*arekie*), garlic, supper dip (Flavoured Instant Powder Drink), in central Ethiopia, though the treatments are not always effective.

Table 8 Disease outbreak and control measures taken in the study areas (in percent)

Variables	District		Overall (N=120)
	Arba minch zuria (N=60)	Kucha (N=60)	
Occurrence of disease			
Yes	100	100	100
No	-	-	-
Control measure taken			
Traditional treatment	100	100	100
Sell immediately	12.5	18.6	15.6
Call in veterinarians	89.8	78.7	84.3
No control measure	-	-	-

Average numbers of chicken mortality by age group in the study area is indicated in Table 10. This result revealed that on average from all age groups chicks less than two week ranked first followed by age group greater than five months. Scavenging system is characterized by high chick mortality in the first two weeks of life, caused mainly by predators and Newcastle disease (32). There was significance difference ($p < 0.05$) between the districts for chicks and adult chickens >5 month mortality. More chicks (<2 weeks) and adults greater than five months mortality were reported in Dire districts. This may be due to lack of chick's management and disease availability which mostly affect chicks and adults specially layers and brooding hens as reported by interviewed households.

Table 9 Average numbers of chicken mortality by age group in one year period

Parameters	Districts		
	Arba minch zuria (N=60)	Kucha (N=60)	Overall (N=120)
Age of birds			
<2 weeks	4.10 ± 2.02 ^b	5.45 ± 2.66 ^a	3.85±2.155 [*]
2 weeks – 2 months	1.91 ± 0.22 ^a	1.73 ±1.25 ^a	0.64 ±1.107 ^{ns}
2-5 months	1.56±0.64 ^a	1.51 ± 0.82 ^a	0.34±0.628 ^{ns}
>5 months	2.63 ± 1.11 ^b	3.05 ± 1.36 ^a	1.81±1.324 [*]

^{a,b} means followed by different superscript letter are significantly different ($p < 0.05$) across rows

3.4.5. Marketing and Market Problems of Poultry in the Study Areas

Table 10 shows the results of this study on poultry marketing. According to (33) efficient marketing system is one major component to increase village chicken contribution to the rural household economy. From the total respondents majority of them revealed that they had market problems related to the chickens and chickens product marketing. Among the market problems raised by the interviewed farmers, distance from market place ranked first followed by fluctuating price or demand of chicken and its product by the consumers, lack of information about the price of the chicken and poor infrastructure like road. This result is in line with the report of (34) who reported that main marketing constrains are fluctuating prices, lack of market, and high cost of transport to local markets.

Table 10 Market problems relate to chicken marketing in the study areas (in percent)

Parameters	Districts		
	Arba minch zuria (N=60)	Kucha (N=60)	Overall (N=120)
Do you have market problems			
Yes	100	100	100
NO	-	-	-
Type of market problem			
Fluctuating demand/ prices	100	100	100
Lack of information about the price of the chicken	100	100	100
Long distance from market	48.4	60.5	54.5
Poor infrastructure	100	100	100

Percentages do not add to 100 because respondents select more than one option.

3.5. Source of foundation and replacement stocks

Table 11 Source of foundation and replacement stock

Source of foundation stock	Districts		
	Arbaminch zuria (N=60)	Kucha (N=60)	Overall (N=120)
Male			
Purchased	79.8	84.7	82.3
Inherited	2.4	-	1.2
Hatched	17.8	15.3	16.5
Female			
Purchased	85.5	89.5	87.5
Inherited	2	-	1
Hatched	12.5	10.5	11.5
Source of replacement stock			
Male			
Purchased	15.45	17.2	16.32
Inherited	3.8	-	1.9
Hatched	80.75	82.8	81.8
Female			
Purchased	15.45	17.2	16.32
Inherited	3.8	-	1.9
Hatched	80.75	82.8	81.8

Source of foundation and replacement stocks of the household in the study area are shown in Table 5. The result of this study revealed that majority of the households bought chickens from market and used their own natural incubation to obtain foundation poultry female and male stock respectively. Almost all of the respondents obtained replacement stock from their own hatched chickens for both sex. Using the own natural incubation to get the replacement stock might

increase the rate of inbreeding in the populations. But in the study areas as mating is uncontrolled and neighbor cocks can mate with every female chicken in the village inbreeding might be not as such boom to unexpected level. There was no significant difference ($p < 0.05$) in source of foundation and replacement flock between districts. Similarly (35) in mid-altitude of central zone of Tigray reported that majority of the respondents bought chickens from market to obtain foundation flock.

3.6. Cultural and religious taboos prohibiting poultry production

The results of current study showed that there is no any cultural, religious and social taboo's prohibiting the raising, consumption and sale of certain type of chickens and other chicken products like egg and meat. In both districts the respondents explained during the study period that the farmers have experience of consuming chicken meat and eggs and they also produce for cash income.

Table 12 Cultural, social or religious taboos affecting rising, consumption and selling of chicken and chicken products

Is there a Taboo's	District		Overall (N=120)
	Arba minch zuria (N=60)	Kucha (N=60)	
Yes	-	-	-
No	100	100	100

3.7. Production and Reproduction Characteristics of Chickens in the Study Areas

The mean age at first lay, number of clutches/ hen/ year and number of eggs/ clutch/ hen are given in Table 23. According to the response of the farmers, the average age at sexual maturity of male, average age at sexual maturity of female and average age at first lay of village chicken were significantly ($P < 0.05$) different between the study districts. Arba minch zuria had relatively higher values which were 5.99, 6.10 and 6.42 months for mean age at sexual maturity of male, age at sexual maturity of female and for mean age of female at first egg, respectively. Average number of eggs per clutch and average number of eggs produced per year from local chickens were significantly ($p < 0.05$) different between the study districts. The results showed that pullets and cockerels found in Arba minch zuria district relatively matured faster than chicken of Kucha districts. This might indicated that the presence of better awareness in management practices, ecotype/ line difference and availability of scavenging and supplementary feed resources in Arba minch zuria district. The overall mean number of clutch per year (3.66) recorded in this study was lower than (30; 36; 37) who reported 5.2, 3.83, and 3.9 in Jamma woreda, study in Ethiopia and Jarso and Horro districts per year respectively.

Table 13 Reproduction and production traits of chickens in the study districts

Variables(mean \pm SD)	Districts		Overall (N=120)
	Arba minch zuria (N=60)	Kucha (N=60)	
ASMM	5.99 \pm 0.51 ^b	6.52 \pm 0.59 ^a	6.25 \pm 0.55*
ASMF	6.10 \pm 0.42 ^b	6.56 \pm 0.47 ^a	6.33 \pm 0.44*
AFEP	6.42 \pm 0.50 ^b	6.92 \pm 0.51 ^a	6.67 \pm 0.50*
NCHPI	9.60 \pm 2.72 ^a	10.36 \pm 1.95 ^a	9.98 \pm 2.33 ^{ns}
NCHSA	6.68 \pm 2.24 ^a	7.28 \pm 1.78 ^a	6.98 \pm 2.01 ^{ns}
AEPPl	18.37 \pm 3.61 ^a	16.32 \pm 3.12 ^b	17.34 \pm 3.36*
NCIYr	3.56 \pm 0.63 ^b	3.76 \pm 1.31 ^a	3.66 \pm 0.97*
EPPYr	52.14 \pm 12.74 ^a	48.78 \pm 8.55 ^b	50.46 \pm 10.64*

^a^b means followed by different superscripts are significantly different ($p < 0.05$); * = significant between studied districts; ASMM = age at sexual maturity of male; ASMF = age at sexual maturity of female; AFEP = age at first egg of pullet; NCHPI = number of chicks hatched per one natural incubation; NCHSA = number of chick survive to adult hood; AEPPl = average egg production per clutch; NCIYr = number of clutch per year; EPPYr = egg production per year.

The lower clutch per year observed in current study might be lower attention and management of chicken by farmers in pastoralist areas. But it is higher than (28) who reported 2.98 clutches per year. This might indicate the variation of broodiness behavior among the Ethiopian ecotypes. As the egg production increases the clutch per year decrease and this may be the main reason for higher clutch per year in Arba minch zuria district than Kucha district. Clutch sizes or number of eggs per clutch also depends on the availability of scavenging feed resources in the area during breeding seasons (38).

3.8. Major Constraints of Poultry Production in the Study Areas

According to the respondents, ranking of major constraints of poultry production are indicated in Table 13. The results of the rankings showed that disease and predators were the major and economically important constraints for the existing chicken production system in both districts. The other village chicken production and reproduction constraints observed in the study districts were lack of knowledge on the husbandry of chickens and lack of well-organized veterinary service. Lacks of housing and low productivity of the birds were not mentioned as a constraint in both districts. Regarding to focal group discussion, participants in the study areas reported that hawks, wild cats, eagles, honey badger, dogs and domestic cats are the major poultry predators. (39) reported that diseases followed by predation were found to be the major constraint of village chicken production in rural area of Ethiopia. (23) also reported that predation was one of the major village chicken production constraints in north-western Ethiopia. This result also agrees with (37) who reported that diseases and predators were the major constraints for chicken production system in Horro and Jarso districts.

Table 14 Ranking of major constraints of poultry production in the study areas

Parameters	Districts						Overall		
	Arba minch zuria			Kucha					
	Sum	Index	Rank	Sum	Index	Rank	Sum	Index	Rank
Disease	58	0.40	1	59	0.39	1	117	0.39	1
Predators	47	0.32	2	41	0.27	3	88	0.29	3
Feed shortage	39	0.27	3	52	0.34	2	91	0.30	2

4. Conclusion

The study was conducted in two districts of Gamo zone, with the objectives to describe poultry husbandry practices in the study sites. A total of 120 indigenous chicken owning farmers for survey were considered in this study. Descriptive statistics, frequency procedures and general linear model were used with SAS 9.1.3 to analyze the data. Results of this study showed that local chicken farmers regarded chicken rearing as secondary to other animals as they provided little or no care to their chickens, which resulted in low productivity.

Livestock researchers and veterinary services put greater emphasis on other animals at the expense of chickens. The average family size was 6.56 ± 3.22 and 5.45 ± 0.15 in Arba minch zuria and Kucha districts, respectively which is large. The chicken production system of the study districts were a free ranging /extensive production system (100%) where local chicken ecotypes are managed mainly on scavenging with seasonal/conditional feed supplementation and the major source of these supplementary feeds were home grown grains and household leftovers. Only a few of the village chicken owners (51.3%) provided separate housing for their birds, but most of them (26.5%) shared their main houses with the chickens.

Major chicken owners (100%) of the study area provided water to birds, especially during the dry season and river water (56.05%) was the major source of drinking water for village chicken in the study area. Experience in disease problems were found in majority of the village chicken owners (100%) in both study districts followed by predators. The average age at sexual maturity for male and female chicken was 6.25 ± 0.55 and 6.33 ± 0.44 months, respectively. The number of clutch per hen per year, eggs per clutch and total eggs produced per hen per year were 3.66 ± 0.97 , 17.34 ± 3.36 and 50.46 ± 10.64 eggs, respectively.

Majority of the farmers in the study areas were illiterate. Chicken production and managements are considered the responsibility of women and children in the study areas. Income and home consumption was the main purpose of chicken production in the study area. Free ranging with low management in terms of feed, housing, health service

characterize the studied extensive chicken production system. The survey results indicate that keeping of chicken was widely practiced in the study areas. The common production system (100%) practiced in both study districts was extensive or the free ranging management systems with only seasonal feed supplementation, where all chickens are left to scavenge during the day time and returned to the house at the night. The result of this study revealed that majority of the households bought chickens from market and used their own natural incubation to obtain foundation poultry female and male stock respectively.

The results of current study showed that there is no any cultural, religious and social taboo's prohibiting the raising, consumption and sale of certain type of chickens and other chicken products like egg and meat. Regarding the outbreak of disease in the study districts in one year (12 month) of time the survey results showed that almost all of the interviewed chicken owners in the two districts were able to recognize the occurrence of poultry diseases which were the main causes for the loss of chicken in the area. From the total respondents majority of them revealed that they had market problems related to the chickens and chickens product marketing.

Based on the conclusion the following recommendations were forwarded as future tasks to be done:

Recommendation

The following points are major future work and scopes that might be done on indigenous chicken in the studied districts:

- To increase poultry productivity there needs to be an urgent intervention by concerned development actors and partners for strengthening the feeding system;
- The farmers have to get awareness on how to use and process locally available feeds for improving the performance of poultry production.
- Technical interventions to support smallholder poultry production need targeting
- Improving technical and institution constraints via adequate delivery of veterinary services, improved feed preparation, proper conservation and improvement locally available poultry feeds, adequate extension service and improved availability of water.
- Balanced feed formulation should be encouraged in order to enable a stable feed supply throughout the year.
- Smallholder poultry producers should be trained up with the concept of feeding interventions and use of balanced ration as well as antibiotic supplementation.
- Market access, housing, feeding and health service should be given priority for attention.

Compliance with ethical standards

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Disclosure of Conflict of Interests

The authors have not declared any conflict of interests.

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