

## Village Chicken Production System and Constraints in Lemo District, Hadiya Zone, Ethiopia

Salo S\*, Tadesse G and Hilemeskel D

Wachemo University, Department of Animal Science, Hossana, Ethiopia

### Abstract

The study was conducted to assess constraints and village chicken production system in Lemo district, southern Ethiopia, using questionnaire on 90 households. The mean flock size was  $13.24 \pm 16.65$ . The dominant chicken production system in the study area was extensive system (90.0%) with scavenging and seasonal supplementary feeding (95.6%) of homegrown grains. The 84.4% of respondent provide water for chicken and 76.7% of the respondents do not construct a separate house to their chickens. The objectives of chicken production in the study area were sources of income (55.6%) and followed by home consumption (13.3%) and both consumption and income (26.7%). The average age at first egg and sexual maturity of female and male were  $22.93 \pm 0.22$  and  $23.18 \pm 0.32$  weeks, respectively. The average egg production per clutch in the study area was  $14.9 \pm 0.23$  with a mean of  $4.14 \pm 0.06$  clutches per year. The overall mean annual egg production was 56.61 eggs/hen/year. The average number of eggs per set and number of chicks hatched per set in the study area were 11.18 and 9.33, respectively. The main constraints of scavenging chicken production were diseases (57.8%), predator (21.1%), feed shortage (16.7%) and lack of improved breed (4.4%). It was concluded that efforts should be made to improvement health care, husbandry practice, and extension service and breeding to increase productivity of chicken at village management system.

**Keywords:** Village chicken production system; Constraint; Feeding; Productivity

### Introduction

In most African countries rural poultry alone provides 70% of poultry products and 20% of animal protein intake [1]. In Africa village poultry production systems are mainly based on scavenging indigenous chickens found in almost all households in the rural areas. They are characteristically an integral part of the farming systems requiring low-inputs with outputs accessible at both inter house hold and intra household levels [2].

Ethiopia is one of African countries with a significantly large population of chickens. Chickens are the most widespread and almost every rural family owns chickens, which provide a valuable source of family protein and income [3]. It is estimated that total chicken population in the country is 44.89 million [4]. With this number Southern Nation, Nationalities and Peoples Region (SNNPR) contribute 7.69 million and holds about 18.8% of the total national chicken population. This region contributes about 18% of the total annual national egg and poultry meat production. Out of total regional chicken population the rural areas comprise about 97.9% of the total regional chicken population while the urban areas constitute 2.1%. Sidama, Gurage and Hadiya Zones together account for about 43.6% of the total regional indigenous chicken population of SNNPR (FAO, 2007). According to CSA data 96.46%, 0.57% and 2.97% of the total chicken population in Ethiopia were reported to be indigenous, hybrid and exotic breed, respectively [4]. According to Halima the majorities (99%) of these birds are maintained under a traditional system with little or no inputs for housing, feeding or health care.

Chicken production and management practice in Ethiopia characterized by extensive production system and the production and productivity of village chicken is low due to flock mortality by disease, predator and poor management practice [5]. There is Large number of chicken in Hadiya zone, which is about 712,024 [4]. Therefore, in Hadiya zone there is potential for chicken production under farmers' level which contributes to national economy as well as change the livelihood of farmers in area. However, there is no information available on

chicken production system and constraint in the study area. Therefore, the objective of his study was to assess chicken production system and constraint under farmer's management condition in the study area.

### Materials and Methods

#### Description of the study area

The study was conducted in Lemo woreda of Hadiya Zone, SNNPR. Hadiya Zone is located at about 232 km of Addis Ababa which is the capital city of Ethiopia. The size of Hadiya Zone is 346958.5 hectare. From this 12.9% is Kola/low land altitude, 68.1% is Weina dega/moderately undulating land and 19% is dega/high altitude areas. Lemo woredas cover 354 km<sup>2</sup> with 128970 human populations. In Lemo Woredas, there are 35 kebeles. The mean annual temperature of Lemo Woredas ranges from 15.1-20 and the elevation is 1501-2500 and 501-2500 masl, respectively. The annual rainfall pattern is starting from June to September which receives 1001 to 1200 mm/year. Generally, in the Hadiya zone rainy (winter) season last from June to August and spring starts from September to November months belongs to the wet season. Summer starts from December to February and autumn starts from March to May months belong to the dry season.

#### Sampling method and data collection

**Sampling:** Multi-stage sampling method was used for data collection. The numbers of kebeles surveyed was purposively selected from woreda based on accessibility and chicken production potential. Thus, 9 kebeles from Lemo woreda was purposively selected. From

\*Corresponding author: Salo S, Wachemo University, Department of Animal Science, Hossana, Ethiopia, E-mail: [sefasalon@gmail.com](mailto:sefasalon@gmail.com)

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each randomly selected kebeles, 10 households that possessed five or more chickens were purposively considered for the survey study. Thus, a total of 90 households were included in the survey.

**Data collection:** Number of chicken in each kebeles and number of kebeles in woredas was collected from Lemo Agricultural Office and Rural Development Office. Information on husbandry practice, constraints in chicken production, important diseases, feed resource, chicken feeding and housing practices, watering, age at sexual maturity, age at first egg laying, average number of eggs per clutch, average number of eggs per set and number of chicks hatched per clutch were collected using semi-structured questionnaire. Direct observation was also made to assess available chicken feed resource, chicken feeding and housing practices, egg handling and storage practices.

### Statistical analysis

Descriptive statistics such as mean, frequency and percentage was calculated and all the surveyed data was analyzed using Statistical Package for Social Sciences (SPSS) version 20 [6].

## Results and Discussion

### Farming system

In the studied area, farmers follow extensive mixed farming system rearing of livestock and crop production. The major crops grown in the central parts of Ethiopia [3]. This result is higher than Solomon et al. who reported the flock sizes of 13.68 birds from Northwest Ethiopia [7]. In general, Flock size varies between seasons mainly due to the availability of feed, the occurrence of diseases, the presence of predators as well as the economic status of the owners. The color of the local chickens found in the study area includes pure colors of white, black, red, grey and mixtures of different colors including (red with black spot, white with black spot, white with red and black spot).

### Flock size of respondent farmers

Data on flock size is presented in Table 1. In the study, the average flock size per household was 17.23. This result is in line with the report of Tadelle et al., who was report an average flock size of 16 birds in the central parts of Ethiopia [3]. This result is higher than Solomon et al. who reported the flock sizes of 13.68 birds from Northwest Ethiopia [7]. In general, Flock size varies between seasons mainly due to the availability of feed, the occurrence of diseases, the presence of predators as well as the economic status of the owners. The color of the local chickens found in the study area includes pure colors of white, black, red, grey and mixtures of different colors including (red with black spot, white with black spot, white with red and black spot).

The major source of chicken for parent stock is market purchased. The majority (46.7%) of the replacement stock originates from the local market and the rest was hatched (16.7%), hatched and purchased (28.9%), and Agricultural office (7.8%). The farmers in the study area keep the exotic breed of chicken like Rhode Island Red and White Leghorn breed that was distributed through the government extension system. However, most farmers have preference for Rhode Island Red.

Variable	N	Over all
Chickens	90	17.23 ± 22.40
<b>Sources of foundation stock (%)</b>		
Purchased	42	46.7
Hatched	15	16.7
Agricultural office	7	7.8
Hatched and purchased	26	28.9

**Table 1:** Chicken size and sources of foundation stock in the study area.

Farmers claim that White Leghorn breed is easily exposed to predators and Rhode Island Red has good market value due to its weight.

### Purpose of keeping chickens

The purpose of chicken keeping in the study area is present in Table 2. The current result indicated that the main objectives of keeping poultry were as sources of income (55.6%) and followed by home consumption (13.3%) and both consumption and income (26.7%) which is in one way or other improve the nutrition status of the family [8]. The rest rise chicken for religious sacrifice (2.2%) and other purpose (2.2%). Similar to this result, Tadelle et al. reported that income generation followed by consumption was the main production objectives for keeping chicken [3]. Halima also reported that income generation was the primary objectives of chicken rearing in North western Ethiopia.

### Village chicken management practices

**Feeds and feeding:** Survey result revealed that scavenging was the major (90.0%) feeding system practiced in the study area, and 95.6% of chicken owners provided supplementary feed to village chicken, especially during feed available seasons (Table 3). Similarly, Halima also reported that 99.27% of the chickens was managed under a traditional or extensive chicken management system in Northwest Ethiopia. Fisseha also reported that 97.5% of chicken owners in North-West Amhara provided supplementary feeds to village birds [9]. In General, good supplementation accelerates growth rate, fertility, weight of chicken and avoid disease occurrence [7].

Home produced grains were the major (65.1%) kinds of feeds stuffs supplemented by farmers (Table 4). Wheat and maize (52.2%), mixture of wheat, maize and sorghum (21.1%), and mixture of sorghum and maize (1.1%) were grains types provided as supplementary feed in the study area, respectively. However, the primary use of these crops was for human consumption (Fisseha, 2009). In addition to grain farmers also supplement wheat bran and food leftovers like boiled Enset (amicho) and baked Enset (kocho). Sometimes farmers also

Parameter	N	Percent
Source of income	50	55.6
Consumption and income	24	26.7
Home consumption	12	13.3
Religious sacrifice	2	2.2
Other	2	2.2

**Table 2:** Purpose of poultry keeping in study area.

Parameters (%)	N	Percent
<b>Types of management</b>		
Extensive	81	90
Semi-Intensive	9	10
<b>Provision of supplementary feed (%)</b>		
Yes	86	95.6
No	4	4.4
<b>Types of supplement</b>		
Grain	56	65.1
Bran, grain and left over	16	18.6
Leftover and bran	14	16.3
<b>Grain supplement</b>		
Wheat and maize	46	63.9
Wheat, maize and sorghum	25	34.7
Sorghum and maize	1	1.4

**Table 3:** Feed resource used by farmers in the study area.

Parameters (%)	N	Percent
<b>Feeding practice</b>		
Throw on the ground	74	82.2
In the container	8	8.9
On the bare ground and feeder	4	4.4
<b>Frequency of feeding</b>		
Once a day	46	51.1
Twice a day	31	34.4
Thrice a day	9	10

**Table 4:** Feeding practice and frequency of feeding chicken in the study area.

Parameters (%)	N	Percent
<b>Sources of feed</b>		
From the house	42	46.7
Purchased	15	16.7
Purchased and from the house	7	7.8
<b>Way of supplementation</b>		
Separate to different classes	6	6.7
Together for the whole group	80	88.9
Usually way offer of the supplement		
In the morning before they go out for scavenging	38	42.2
Both in the morning and any time during day	13	14.4
In the afternoon while scavenging	1	1.1
Any time during day times	34	37.8
<b>Basis to give supplements</b>		
Egg yield	55	61.1
Meat yield	5	5.6
Broodiness	3	3.3
Age	6	6.7
Egg, meat, broodiness and age	13	14.4
Egg and meat	4	4.4

**Table 5:** Sources of supplementary feed and way of supplementation in the study area.

use cabbage as supplement for chicken especially for exotic breeds. Spreading the grain on the floor was the major (82.2%) way of providing supplementary feed. Mapiye and Sibanda also reported that only 11.4% of village chicken growers in Rushinga district of Zimbabwe prepared feeding trough for village chicken [10]. Accordingly about 51.1% of respondents provide supplementary feed once a day. About 34.4% and 10.0% of respondent provide supplementary feed twice and Thrice per day, respectively.

Overall 88.9% of the respondents were feeding their chicken flock in group and the rest 6.7% of the respondents fed separately to the different age classes of chickens. Results also showed that farmers provide supplementation for chickens in the morning before scavenge (42.2%), at any time of the day (37.8%) and both in the morning before scavenge and at any time of the day (14.4%). As a result indicated in Table 5 most of respondents provide supplement to increase egg yield (61.1%). The rest provide supplement to increase meat yield (5.6%), considering broodiness (3.3%) and age of birds (6.7%). According to Gunaratne, small amounts of strategically administered supplements are likely to increase production and minimize mortality once the other constraints have been tackled.

**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. About 84.4% of the respondent in the study area provided water for their chickens. Water is freely available during the wet season from rainwater collected on the ground. At dry season, 47.8% of respondent was provided tap water once/day (42.2%). This

indicated that farmers have access to clean water which is initiated by government and non-governmental organization (NGO) in the study area. The rest of respondent provide river (21.1%), and ground and spring water (15.6%). Water is provided on broken clay, cover of bucket and any other broken plastics. Sometimes chicken drink water while peoples washing their body and house utensils.

**Housing:** Housing is essential to chickens as it protects them against predators, theft, inclement weather (rain, sun, cold wind, dropping night temperatures) and to provide shelter for egg laying [11]. About 76.7% of the respondents have no separate poultry house (Table 6). This indicates that the owners are not aware of the importance of housing. According to Meseret such a situation might be attributed to the fact that women own and manage rural household poultry whereas construction of poultry house is the job of husbands [8]. The result indicated that all farmers provided night shelter (Table 6) for their chickens in part of the kitchen (1.1%), in the family dwellings (9.9%), under baskets (8.9%), and in the house purposely made for chicken (64.4%). These shelters were made of locally available materials such as Eucalyptus poles and bamboo. In line with this result Mekonnen reported that there were no separate poultry houses in Dale, Wonsho and Loka Abaya Weredas of sidama zone and chicken was provided with overnight shelter with simple chicken nest made of cartoon or local basket and perch confined within the main house [12]. Similarly, in Botswana 35.8% of the indigenous chicken farmers provided housing of some kind [13].

### Major constraints

Constraints of chicken production in the study area are presented in Table 7. According to the survey result diseases (57.8%), predator

Parameters (%)	N	Overall
<b>Water supplementation</b>		
Yes	76	84.4
No	14	15.6
<b>Frequency of watering</b>		
Every other day	2	2.2
Once/day	43	47.8
Twice/day	27	30
Ad libitum	4	4.4
<b>Sources of water</b>		
River	19	21.1
Tap water	43	47.8
Ground and spring water	14	15.6

**Table 6:** Water provision for village chickens and sources of water.

Parameter (%)	N	Percent
<b>Separate house</b>		
Yes	21	23.3
No	69	76.7
<b>Night shelter of chicken</b>		
In the kitchen	1	1.1
Family dwellings	8	8.9
Under basket	2	2.2
In the house purposely made for chicken	58	64.4
<b>Reason not construct separate house</b>		
Lack of knowledge	43	47.8
Fear of predator	13	14.4
Shortage of material	7	7.8
Theft	4	4.4
Lack of man power	2	2.2

**Table 7:** Housing of village chicken in the study area.

(21.1%), feed shortage (16.7%) and lack of improved breed (4.4%) were major constraints of chicken production. In line with current result, Halima reported that diseases and predator were major factor that causes loss of chicken in Northwest Ethiopia. Predator like hawk, wild animals and cat were main cause of mortality in study area. As observed in transect walk farmers tie hen in and around gate with rope to reduce loss of young chicken with predator.

### Production and productivity of village chicken

**Age at sexual maturity:** Age at sexual maturity of the indigenous chickens in the study area is given in Table 8. Mean sexual maturity female was  $22.93 \pm 0.22$  weeks. Mekonnen also reported age at first egg of 7.07 months from indigenous pullets of Dale woreda which is longer than that of the current study woredas. Mean sexual maturity of male was  $23.18 \pm 0.32$  weeks [12]. Similarly, Halima reported that 77.4% of cocks of local chicken ecotypes in North-West Ethiopia reached maturity at 20-24 weeks of age.

**Egg production performance:** According to Mekonnen productivity of birds mainly depends on the production and management system followed in managing the birds [12]. As reported by several authors, indigenous chickens are generally known to lay fewer eggs as compared to exotic chickens [11]. The average number of eggs per clutch ( $14.47 \pm 0.23$ ) is higher than national average of 12 reported by CSA (Table 8) [14]. This result was similar to finding of Mekonnen who was reported that 14.9 eggs/hen/clutch from Sidama Zone of Southern Ethiopia [12]. The average number of eggs/clutch in the current study (14.44 eggs) was agree with the result of 9-19 eggs reported by Halima in North-West Ethiopia. The average number of clutch per year recorded from current study was  $4.12 \pm 0.05$ . This result was higher than clutch number 3.7 reported by Mekonnen from Dale, Wonsho and Loka Abaya Woredas of Southern Ethiopia. On average number of eggs per set and number of chicks hatched per set were 11.18 and 9.33, respectively [12].

Average annual egg production of chickens was 56.61 eggs (Table 9), which was higher than 54.9 and 51.44 eggs/year/head from Loka Abaya and Dale woredas of Sidama zone reported by Mekonnen [12] and 36-42 eggs/year/head from Ambo reported Fikere [15]. Average annual egg production of chickens was also higher than 32eggs/year reported from Assela [16]. This may be due to number of clutch, inter brooding length and average day for weaning young chicken. The current results indicate that there is availability of better potential in egg production potential of the indigenous chickens in study area [17-20].

Major constraints	N	Percent
Disease	52	57.8
Lack of improved breed	4	4.4
Feed shortage	15	16.7
Predator	19	21.1

**Table 8:** Major constraints of chicken production in study area.

Trait	Mean $\pm$ SE
Age of sexual maturity of male	$23.18 \pm 0.32$
Age of sexual maturity of female	$22.93 \pm 0.22$
Number of clutch/year	$4.14 \pm 0.06$
Number of eggs/clutch	$14.47 \pm 0.23$
Number of eggs/set	$11.18 \pm 0.28$
Number of chicks hatched/set	$9.33 \pm 0.26$
Number of eggs/year	$56.61 \pm 1.09$

**Table 9:** Reproductive and productive performances of the local hen study area.

This might be due to unknown genetic factors associated with the local breed [12]. In general, 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 which are a function of management [12].

### Conclusion

Poultry production is one of income extension system and widely practiced by farmers in study area. It is practiced by every farmers as side line with other farming activities and offer farmers with further income. And also used as starting point for young to establish business idea. As observed in this study chicken production in study area was hindered due to poor management like health care, feed shortage, lack of improved breed and predators. This problem can be overcome by slight advance in poultry house, cross breeding with exotic breeds and vaccination of chicken. Therefore, information should be disseminate to farmers about chicken husbandry and government should provide vaccine and improved breeds of chicken for farmers.

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