Research Article

Characterization of village chicken production and marketing systems in Ankober Woreda, North Shewa Zone, Amhara Regional State, Ethiopia

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Introduction

Backyard/village poultry production in Ethiopia represents a significant part of the national economy. Poultry production in Ethiopia is analogous to chicken production. The total chicken population was estimated at 60.04 million, from which 88.5% indigenous, 6.25% cross, and 5.25% were exotic breeds [1]. Poultry production is an important sector in most parts of Ethiopia where chickens and their products are used as a source of income for immediate household expenses and a source for improved nutrition. Poultry production is also important for income generation and poverty alleviation in rural areas. Hence, the aim of this study was to characterize the village chicken production and marketing systems in Ankober Woreda, North Shewa Zone, Amhara Regional State, Ethiopia.
of high-quality protein nutrition. In Ethiopia, indigenous chicken contributes high-quality animal protein in the form of eggs and meat for home consumption as well as for cultural and religious consideration [2]. Village chickens are sold in local and urban markets to traders (collectors) or directly to consumers depending on the location of the farm dwelling [3]. According to Waktole, et al. [4], plumage, color, and comb type are some factors affecting the price of chicken at the market in this study area. Most chicken producers prefer egg and meat of local chicken because of its tasty flavor.

Among chicken production system, village chicken production is highly practiced under rural condition due to small feed cost, space requirement, and low price [5,6]. Indigenous chickens also have a unique character like ideal mothers, good sitters, excellent foragers, hardy, and are believed to possess better natural immunity against common poultry diseases, have good egg and meat flavor, hard eggshells, high fertility, and hatchability [3]. In Ethiopia, different researchers investigated the indigenous village poultry production system; however, lack of knowledge about poultry production, limitation of feed resources, and prevalence of diseases and predators remain to be the major challenges in village-based chicken productions [5]. Introduction of exotic chicken is inevitable and there has been a substantial effort to improve hybrid layer chickens particularly Sasso to smallholder farmers under the backyard management system in Ankober Woreda. However, due to lack of recorded data on performance and all tasks related to management aspects, lack of regular vaccination program and market information makes it difficult to assess the importance and contributions of exotic chicken to the owners in the past attempts to improve the sector [5].

North Shewa Zone is one of the 13 Zones of the Amhara Regional State and consists of 24 rural Woreda and 6 town administrations. According to CSA [7], the estimated livestock populations of the North Shewa zone were 1,323,720 cattle, 1,644,881 sheep, 732,433 goats, 41,055 equines, respectively. The mean minimum and maximum annual rainfall are about 731 mm and 979 mm, respectively. The mean minimum and maximum temperatures are 4.3°C and 23.4°C, respectively. The woreda has a livestock population of 67,208 local chickens, 41,000 exotic (Sasso) chickens 61459 cattle, 32,673 sheep, 57,933 goats, 11,055 equines, and 1237 camel (Woreda agricultural office report, 2019).

The Woreda is characterized by two seasons, the wet season from June to September and a dry season from October to May. The farming system in the area is predominantly mixed crop-livestock production systems. The woreda is classified into highland (> 2500 m.a.s.l.), midland (1500-2500 m.a.s.l.), and lowland (< 1500 m.a.s.l.) Agro Ecological Zones (AEZ). The Woreda has 19 kebeles with different agro-ecological zones comprising of 6 lowlands, 8 midlands, and 5 highland kebeles (Woreda agricultural office report, 2019) Figure 1.

**Research design and study populations**

The study employed a household survey and observational studies. The poultry producers and village chickens in Ankober Woreda were the study populations. A cross-sectional survey was conducted to collect data from selected households. Households keeping chicken were the sampling units and chickens of different breeds were randomly sampled.

**Sampling procedure and sample size**

A multi-stage sampling procedure was followed to select respondent farmers. First Kebeles in the Woreda were clustered based on agro-ecologies. Six representative kebeles were selected and two from each AEZ with the criteria of village poultry production potential. In the second stage, 180 sample households were selected randomly from the list of farmers keeping chickens. The sample households included in the study were determined according to the formula given by Arsham (2005):

\[ N = \frac{0.25}{SE^2} \]

Where \( N \) = Sample Size, \( SE \) = Standard Error

Then, using the standard error of 0.038 with a 95% confidence level [8], 180 households were included in the study. The numbers of respondents (farmers) per single kebele are determining by the proportionate sampling technique as follows Table 1:

\[ W = \frac{A}{B} \times No \]

Where;

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**Material and methods**

**Description of the study area**

The study was conducted at Ankober Woreda, which is one of the Woredas in North Shewa Zone of the Amhara Region. Gorebela town is the center of Ankober Woreda located at about 172 km from Addis Ababa, 735 km far from Bahir Dar the capital city of the Amhara National Regional State and 42 km from Debre Berhan the capital city of North Shewa Zone. The Woreda covers an area of 69,306 hectares with a human population of around 93,329 (Woreda agricultural office report, 2019). In the Woreda, there are many lodges such as Wosengeded, Likemarefy, and Wofwasha. The altitude ranges between 1300 and 3700 meters above sea level. The mean minimum and maximum annual rainfall are about 731 mm and 979 mm, respectively. The mean minimum and maximum temperatures are 4.3°C and 23.4°C, respectively. The woreda has a livestock population of 67,208 local chickens, 41,000 exotic (Sasso) chickens 61459 cattle, 32,673 sheep, 57,933 goats, 11,055 equines, and 1237 camel (Woreda agricultural office report, 2019).

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\[ W = \frac{A}{B} \times No \]

Where;
W = Sample of farmers determines per single selecting kebele;
A = Total number of households (farmers) living per single selected kebele;
B = Total sum of households living in all sample kebeles;
No = the total required calculated sample size of the population.

Emphasis was given on village chicken husbandry system, productive and reproductive performances, the current status of village chicken meat and egg consumption, marketing system of village chicken and eggs, major constraints and farmers intervention to reduces the constraints of village chicken production were the core points considered during data collection. Besides, to this, the management practices were assessed through observation of the incorporation of recommended scientific husbandry packages applied by each household. Provision of housing, additional feed, agricultural extension system used, marketing, vaccination practices, and use of modern medication was assessed by using a questionnaire survey. In addition to data collection by using a questionnaire, there were also general inspections regarding housing, feeding, and watering and the health condition of poultry.

**Methods of data collection**

Questionnaire survey: A cross-sectional survey was carried out for each sampled household. The semi-structured questionnaires were prepared and pre-tested before starting the actual data collection. Data focusing on the status of keeping village chicken, use of extension packages, and its constraints were collected from member(s) of the households directly responsible for management and care of village chickens. Emphasis was given on village chicken husbandry system, productive and reproductive performances, the current status of village chicken meat and egg consumption, marketing system of village chicken and eggs, major constraints and farmers intervention to reduces the constraints of village chicken production were the core points considered during data collection. Besides, to this, the management practices were assessed through observation of the incorporation of recommended scientific husbandry packages applied by each household. Provision of housing, additional feed, agricultural extension system used, marketing, vaccination practices, and use of modern medication was assessed by using a questionnaire survey. In addition to data collection by using a questionnaire, there were also general inspections regarding housing, feeding, and watering and the health condition of poultry.

Focus group discussion: Focus group discussions consisted of six knowledgeable individuals for each selected kebele. The researcher facilitated the discussions at all the sites. Individuals for focus group discussions were selected with the help of agricultural extension workers and knowledgeable individuals. Their age and experience on village chicken production, knowledge about housing, feeding, and water activities, meat and egg utilization, and major challenges of village chicken production were considered. Elders, females, village leaders, and individuals who know the village chicken production and constraint of village poultry production in six kebeles have participated in the discussions.

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Data analysis

The data were entered using Microsoft Excel spreadsheets and analyzed using SPSS (Version, 24). The descriptive statistics were employed for describing production and reproduction performance, the status of husbandry practices, constraints and the farmer intervention to reduce the constraint of village chicken production in the Woreda. Agro-ecology and breed used as a fixed factor–alpha 0.05 mean separation were done by Tukey test.

Statistical model for Survey: \( Yij = \mu + A_i + B_j + AB_{ij} + \epsilon_{ij} \)

Where: \( Yij \) = The value of the respective variable

\( \mu \) = Overall means of the respective variable

\( A_i \) = The fixed effect of agro-ecology on the respective variable

\( B_j \) = Breed effect

\( AB_{ij} \) = Interaction effect of the breed by agro-ecology

\( \epsilon_{ij} \) = Random error NID (mean = 0, and \( \sigma^2 = 1 \))

Ranking and index

Ownership and management of indigenous chicken were analyzed under index method with ranking. An index was calculated according to the formula [9].

\[ \text{Index} = \frac{[(4 \times \text{number of household rank first}) + (3 \times \text{number of household rank second}) + (2 \times \text{number of household rank third}) + (1 \times \text{number of household rank fourth})]}{4} \]

Wealth status classification criteria

The wealth classification criteria developed by Ankober Woreda Agricultural Office (2019) was followed to categorize the HHs into different wealth status:

- HHs having the land, 1 ox, 1 donkey and houses made of grass-roof are categorized into poor wealth status.

Results and discussion

Socio-economic characteristics of farmers

The survey results indicated that the keeping of chicken is widely practiced in Ankober Woreda North Shewa Zone of Ethiopia. From the total interviewed village chicken producers males were dominant (77.78%) in all Agro-ecological Zones (AEZ) (Table 2). The overall average age of respondents was 41.92±2.41 years, which indicated that they are more experienced in poultry production. And comparable with Yisma and Kebede [10] who reported average ages of 40.75 ±1.79, 39.4 ± 1.90, and 44.65 ± 1.69 years in Kewot, Menze Gera Mider, and Moretina Jiru Woreda respectively [10]. While the average family size in the Woreda was 4.60 persons presented in Table 2, which is comparable with the national average of 4.7 persons [11] and lower than the mean family size of 6.2 in North Gondar Zone, Ethiopia reported by Moges, et al. [5] and Addis [12]. This may be due to using contraception methods or family planning.

From total respondent 55% of them can read and write it is important for giving extension service and they were ready to accept and implement new technology and the current finding was less than that the report of Sodeno [13] in Kersa woreda; East Hararghe Zone, Ethiopia 86% of respondents can read and write. Most (80.56%) grouped under better-off wealth status may be related to educational level. And most (87.78%) of respondents HHs were married. All respondents depend

| Parameter | Highland (N=46) | Mid land (N=70) | Low land (N=64) | Total(N=180) |
|-----------|-----------------|-----------------|-----------------|--------------|
| Sex (%)   |                 |                 |                 |              |
| Male      | 35(76.09)       | 56(80)          | 49(76.56)       | 140(77.78%)  |
| Female    | 11(23.91)       | 14(20)          | 15(23.44)       | 40(22.22%)   |
| Educational level (%) |       |                 |                 |              |
| Illiterate| 15(32.61)       | 33(47.14)       | 33(51.56)       | 81(45%)      |
| Write and Read | 6(13.04)       | 16(22.86)       | 15(23.44)       | 37(20.56%)   |
| Grade 1-8 | 16(34.78)       | 19(27.14)       | 13(20.31)       | 48(26.67%)   |
| Grade 9-12 | 9(19.57)       | 2(2.86)         | 3(4.69)         | 14(7.78%)    |
| Wealth status (%) |     |                 |                 |              |
| Poor      | 11(23.91)       | 2(2.86)         | 5(7.81)         | 18(10%)      |
| Medium    | 6(13.04)        | 4(5.71)         | 7(10.94)        | 17(9.44%)    |
| Better-off| 29(63.04)       | 64(91.43)       | 52(81.25)       | 145(80.56%)  |
| Marital status (%) |     |                 |                 |              |
| Married   | 35(76.09)       | 67(95.71)       | 56(87.5)        | 158(87.78%)  |
| Unmarried | 11(23.91)       | 3(4.29)         | 8(12.5)         | 22(12.22%)   |
| Categories (Mean±SEM) | (Mean±SEM) | (Mean±SEM) | (Mean±SEM) |              |
| Family size | 4.43±0.23    | 5.10±0.20       | 4.26±0.21       | 4.50±0.22    |
| Farm Size (ha) | 1.08±0.06  | 1.19±0.08       | 1.04±0.12       | 1.10±0.09    |
| Average Age | 43.02±12.48  | 39.97±11.99     | 42.76±2.76      | 41.92±2.41   |

SEM= Standard error of the mean
on mixed-livestock production and 6(3.33%) were based on both government employe and mixed-livestock production. Agricultural crop produced in the study area was wheat (84.44%), tef (75%), maize (68.33%), bean (28.89%), barely (24.44%) and sorghum (11.11%) this indicated that wheat is the major crop followed by tef and maize.

**Chicken flock characteristics**

The mean values of chicken flock structure in different AEZ, age, and breed categories are described in Table 3. The average local chicken holding in the area was 11.12 and mean holding per HH for hens, cocks, pullets, cockerels, and the young chicken were 3.43, 1.16, 1.81, 1.57, and 3.16, respectively. There was a significant difference (P<0.05) in local hen population between highland and midland AEZ of the study area. However, there was no significant difference (P>0.05) between exotic hen across AEZ of the study area. A study conducted by Abera and Geta [14] indicated that the mean flock size per HH for cocks, hens, pullets, cockerels, and chicks was 1.12, 4.20, 2.13, 1.54, and 2.63, respectively, indicating that hens and chicks were the dominant class of the flock in Haramaya Woreda of Eastern Ethiopia similar to the present study. This indicated that egg is the major chicken product produced and chicken flock replacement [4].

The mean chicken holding (11.12) in the study site was higher than the study result (6.23) reported by Molla [15]. However, a higher chicken size per HH (13.10 and 12.38) was reported by Moges, et al. [5] in Bure and Fogera Woreda, respectively which are higher than the present result. The result of the current study is higher than reported by Mekonnen [16] the average chicken size per HH for hens, cocks, pullets, cockerels, and chicks was a signifi cant difference (P<0.05) between exotic hen across AEZ of the study area. A study conducted by Abera and Geta [14] indicated that the mean flock size per HH for cocks, hens, pullets, cockerels, and chicks was 1.12, 4.20, 2.13, 1.54, and 2.63, respectively, indicating that hens and chicks were the dominant class of the flock in Haramaya Woreda of Eastern Ethiopia similar to the present study. This indicated that egg is the major chicken product produced and chicken flock replacement [4].

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**Chicken husbandry practice**

**Poultry feeding and watering practice:** The feed is the most important factor that influences the productivity of chicken. It is impossible to expect optimal production in the absence of an adequate supply of the required nutrients. The survey result of the feeding practice of village chicken in the study Woreda is presented in Tables 4. The majority of the respondents (96.1%) in the study area practiced scavenging with supplementation and have significant (P<0.05) different across different AEZ. While 3.89% of the respondents practiced only scavenging it may be due to exotic (Sasso) chicken cannot survive only with scavenging. A similar result was reported by [8,19] in Ada’a and Lume Woreda of east Shewa where 98.2% of the respondents practiced scavenging with additional supplement. Leta and Endalew [20] also reported that 94.6% of the respondents in the Mid Rift Valley of Oromia region practiced scavenging with conditional supplementation. According to Abera and Geta [14] report that all (100%) of the respondents in Haramaya Woreda of Eastern Ethiopia practiced scavenging system with supplementary feeding.

The major feed resources in the study woreda was grain (89.4%) such as maize and wheat (due to crop production is common in the area), kitchen waste (9.4%), and different by-products (1.1%) such that frushika. Farmers provide a handful of feed composed of local ingredients as supplementary feed including maize, wheat, kitchen waste, and frushika once a day. However, the provision of supplementary feed is highly dependent on the season of harvest and availability of cereal grains. Source of supplementary feed for the chickens is crop harvest as 98.89% of the respondents provide supplementary feed in the study Woreda. As Dessie, et al. [21] reported, 87.1% of the feed available for chicken were produced locally. The type of supplemental feeds varied based on the type of agricultural practice and season. Both in midland and lowland, there is more provision of maize and wheat which is 93.15% and 91.18 % respectively. However, the provision of maize and wheat in the highland area was (79.63%). The provision of frushika was found to be higher in highland compared to lowland and midland. The present result was similar to the finding of Yami and Dessie [22] who reported that scavenging feed resource was base for local birds were inadequate and variable depending on the season. Farmers used different feed for a broody hen at natural incubation; like wheat (65%), maize (65.56%), sorghum (3.33%), injera (25%) and injera with chilly (8.33%) one respondent may use different feed type.

**Table 3: Village chicken flock per households in Ankober Woreda.**

| Categories | Agro-ecology | Highland (Mean±SEM) | Midland (Mean±SEM) | Lowland (Mean±SEM) | Overall Mean (Mean±SEM) | P[0.05] |
|------------|--------------|---------------------|-------------------|--------------------|------------------------|---------|
| Local      |              |                     |                   |                    |                        |         |
| Hens       |              | 3.83±0.247±         | 3.13±0.174±       | 3.30±0.183±        | 3.42(30.7)             | *       |
| Cocks      |              | 1.17±0.08           | 1.12±0.46         | 1.20±0.082         | 1.16(10.4)             | NS      |
| Pullets    |              | 1.58±0.176          | 1.82±0.149        | 2.03±0.165         | 1.81(16.3)             | NS      |
| Cockerels  |              | 1.08±0.00           | 1.65±0.498        | 2.08±0.313         | 1.59(14.3)             | NS      |
| Chicks     |              | 2.69±0.208±         | 2.52±0.217±       | 4.26±0.518±        | 3.16(28.4)             | NS      |
| Total (Mean) |            | 10.35               | 10.22             | 12.87              | 11.14                  |         |

| Exotic (Sasso) |              |                     |                   |                    |                        |         |
| Hens          |              | 2.35±0.253          | 2.97±0.617        | 3.44±0.472         | 2.92(48.7)             | NS      |
| Cocks         |              | 1.08±0.083          | 1.07±0.071        | 1.04±0.000         | 1.06(17.7)             | NS      |
| Pullets       |              | 1.91±0.163±         | 1.88±0.120±       | 2.29±0.101±        | 2.03(33.8)             | *       |
| Total (Mean)  |              | 5.34                | 9.2              | 6.73               | 9.36                   |         |

SEM = Standard Error of Mean; NS = P>0.05; *** = P<0.001; ** = P<0.01 and * = P<0.05

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Watering practice in the Woreda is presented in Table 5. Water plays a vital role in the transport of nutrients, metabolic reactions, and elimination of wastes. The vast majority of the respondents (98.3%) in the Woreda provided water for their chicken. The remaining (1.7%) did not provide water at all. 89.4% of the respondents provided water free access a day, 8.3% of the respondents provided water in the morning only and the remaining 2.2% of respondents provided water in the evening only. The result of the current study is dissimilar with that of Tadesse, et al who reported that 96.1% of chicken owners in Ada’a and Lume Woreda of east Shewa provided water free access for chickens. Tadesse[23] also reported that all of the respondents provided water for the chickens in Dire Dawa town. Farmers used various sources of water for chicken based on the availability of water in their locality. River, tap water, whole water, and pond water were used as a source of water for the chickens according to 53.9%, 30.5%, 14.4%, and 1.1% of the respondents, respectively. Most of the chicken owners (51.7%) provide water using watering trough made of clay made dishes. The remaining 36.7% and 11.7% provide using materials plastic dish and wooden trough, respectively. Farmers give water for broody hen daily. From the total respondents, those who gave one time, two times, and free access was 61.67%, 21.11%, and 17.22%, respectively. Most (98.3%) provide water for their chicken across different AEZ.

Poultry housing: Housing condition is one of the most important factors which influence the health conditions, safety, and productivity of chicken. In the present study, the birds are mostly kept to scavenge for feeds during the day and confined at night. About 61.1% surveyed households have separate poultry house and 38.9% surveyed households did not have separate poultry house (Table 6) this facilitate disease and parasite infestation. During the day, birds spend most of their time scavenging around the family dwelling. Although birds are protected from predators and bad weather at night time, there is a risk of disease transmission as they share the same dwelling with family and other domestic animals. Farmers described various reasons for lack of awareness for not constructing separate poultry houses. About 61.1% surveyed households have building houses, 34.4% share the same house with their chicken. In contrary to the current finding, Tadesse, et al [19] who reported that 96.1% of chicken owners in Ada’a and Lume Woreda of east Shewa, respectively. Mogesse[24] reported that about 50.77% of chicken owners provided separate houses for poultry in Ada’a and Lume Woreda of Ethiopia, respectively. Mekonnen [16] who reported 97.6% of the respondents in

animal house with perch, and only 4.4% of the respondents share the same house with their chicken. In contrary to the current finding, Tadesse, et al [19] reported that 91.11% and 95.6% of the respondents constructed separate houses for poultry in Ada’a and Lume Woreda of East Shewa, respectively. Mogesse [24] reported that about 50.77% of chicken owners in northwest Amhara provided separate sheds purposely made for chickens. According to Moges, et al [5], 22.1%, 59.7%, and 3.4% of the respondents constructed separate houses entirely for the chicken in Bure, Fogera, and Dale Woredas of Ethiopia, respectively. The survey result is dependable with the finding of Mogesse [24] who reported 97.6% of the respondents in

### Table 4: Housing system of village chickens in Ankober Woreda (% respondents).

| Parameters                        | Description              | Highland N=(46) | Midland N=(70) | Lowland N=(64) | Overall N (%) |
|-----------------------------------|--------------------------|----------------|---------------|---------------|--------------|
| Presence of Separate Poultry House| Yes                      | 35(71.7)       | 30(71.4)      | 45(68.8)      | 110(61.1%)   |
|                                  | No                       | 11(22.8)       | 40(52.9)      | 21(31.3)      | 70(38.9%)    |
| Housing System                    | Share the room with perch| 3(6.5)         | 1(1.4)        | 3(4.7)        | 8(4.4%)      |
|                                  | Building house           | 35(76.1)       | 30(42.9)      | 45(70.3)      | 110(61.1%)   |
|                                  | Share the house with Perch| 7(15.2)        | 39(55.7)      | 16(25)        | 62(34.4%)    |
| Poultry house made from          | Wood                     | 10(21.7)       | 44(62.9)      | 19(29.7)      | 73(40.6%)    |
|                                  | Mud and iron sheet       | 36(78.3)       | 26(37.14)     | 45(70.3)      | 107(59.4%)   |
| Importance of poultry house       | Prevent from predator    | 34(73.9)       | 58(82.9)      | 52(81.3)      | 144(80%)     |
|                                  | Prevent from bad weather | 12(26.1)       | 12(17.1)      | 12(18.7)      | 36(20%)      |

N = Number of respondents

### Table 5: Provision of water for village chicken in Ankober Woreda.

| Parameter | Description       | Highland N=(46) | Midland N=(70) | Lowland N=(64) | Overall N (%) |
|-----------|-------------------|----------------|---------------|---------------|--------------|
| Provision of water | Yes            | 45(97.8)       | 69(98.6)      | 63(98.4)      | 177(98.3%)   |
| Frequency of Watering | Free access    | 44(95.7)       | 60(85.7)      | 57(89.1)      | 161(89.4%)   |
| Source of Water      | Whole water     | 15(32.6)       | 5(7.14)       | 6(9.4)        | 26(14.4%)    |
|                       | River           | 17(36.95)      | 41(58.57)     | 39(60.9)      | 97(53.9%)    |
|                       | Tap water       | 14(30.4)       | 22(31.43)     | 19(29.7)      | 55(30.5%)    |
|                       | Pond water      | 0(0)           | 2(2.9)        | 0(0)          | 2(1.1%)      |

### Table 6: Feeding practices of village chicken in Ankober Woreda.

| Parameters                        | Description             | Highland N=(46) | Midland N=(70) | Lowland N=(64) | Overall N (%) |
|-----------------------------------|-------------------------|----------------|---------------|---------------|--------------|
| Feeding System                    | Scavenging only         | 0 (0)          | 6 (8.57)      | 1 (1.56)      | 7 (3.89%)    |
|                                   | Scavenging with Supplemen-tation | 46(100)    | 64(91.43)     | 63(98.4)      | 173(96.1%)   |
| Major Feed Resources              | Grain                   | 41(89)         | 63(90)        | 57(89.1)      | 161(89.4%)   |
|                                   | Kitchen Waste           | 5(10.9)        | 7(10)         | 5(7.8)        | 17(9.4%)     |
|                                   | Different by-Products    | 0(0)           | 0(0)          | 2(3.12)       | 2(1.1%)      |
| Frequency of Feeding              | Morning and evening     | 15(30.4)       | 23(32.9)      | 37(57.8)      | 75(41.7%)    |
|                                   | Morning and afternoon   | 8(17.4)        | 16(22.36)     | 10(15.6)      | 34(18.89%)   |
|                                   | Morning, Afternoon and Evening | 23(50)      | 32(45.71)     | 16(25)        | 71(39.44%)   |
| Do you Provide Supplement Feed?   | Yes                     | 45(97.8%)      | 69(98.6)      | 63(98.4)      | 178(98.89%)  |
| Type of Supplementary Feed        | Maize and Wheat         | 43(79.63%)     | 68(93.15%)    | 62(91.18%)    | 173(88.72%)  |

Citation: Getabalew M, Alemneh T, Zewdie D (2020) Characterization of village chicken production and marketing systems in Ankober Woreda, North Shewa Zone, Amhara Regional State, Ethiopia. Int J Vet Sci Res 6(2): 128-141. DOI: https://dx.doi.org/10.17352/ijvsr.000064
Poultry diseases and health care: Results of chicken diseases and control measures in the study Woreda are presented in Table 7. The survey result showed that 97.8% of the interviewed chicken owners were able to recognize the occurrence of poultry diseases which are the main causes of the loss of chicken in the area. The awareness of the respondents for disease in the highland (97.8%), midland (97.1%) and lowland (98.4%) in terms of the occurrence of poultry diseases. The most dominant poultry disease in the study area was NCD (locally perceived as Yedoro Beshita meaning Poultry disease) 50.6% (95.7% in the highland, 51.3 in the midland and 58.6% in the lowland) of the respondents followed by mite 49.4% (48.4% in the highland, 41.4% in the midland and 4.3% in the highland) of the respondents.

Studies conducted in different parts of the country by various authors [5,15,25] also confirmed that NCD is the major cause of death for village chickens followed by a mite. The most common feed ingredients utilized by farmers for chickens disease control were lemon, garlic, green pepper, salt mixed with Injera, and water. About 40.0%, 58.3%, and 1.7% of the chicken owners in the area practiced vaccination, treatment, and traditional method, respectively. As Tegegne [8] reported that 50.6% (21.2% in Ada’a and 80% in Lume Woreda) of the respondents in East Shewa used vaccines to control poultry diseases. Predators are also mentioned by the interviewed farmers and key informants in the Woreda as the major causes of the loss of village chicken next to diseases. The most common predators in the area include cats, dogs, and wild cats (Shelemetmat). Another study conducted by Leta and Endalew [20] indicated that the main causes of chick mortality were birds of prey (34%), cats and dogs (16.3%), wild animals (15%), diseases (34%) and accident (0.7%). Out of a total 40% of the respondents can accesses veterinary service and 40% vaccinate its bird before disease occurrence and 78.89% got treatment from kebeles clinic. Chicken owners access the vaccination calendar in May and June for NCD prevention. As farmers said source of infection for their chicken was from own flock (12.2%), from incoming markets chicken (58.89%), neighboring household (43.33%), neighboring village (18.33%), and unknown source (18.89%). And as farmers report mortality of chicken mostly occurred during the rainy season (58.89%), dry season (8.33%), and both season (32.78%) at rainy season chicken can dig out the earth and accesses the parasite.

Performance of village chicken

Results of the production and productivity performance of local chicken in the study area are presented in Table 8. The mean age at the first egg in the study woreda was 6.1 months (6.19, 5.81, and 6.22 months for highland, midland, and lowland agro-ecologies, respectively). The current finding was less than the result reported by Mekonnen [16] who found an average age at the first egg of 7.07 months in Dale, Wonsho and Loka Abaya Woreda of Southern Ethiopia and higher than the mean age at the first lay of 5.35 months reported by Mamo [26]. This may be due to farmers follow good management for chicken and the review conducted by Mamo [27] which revealed the average age at first egg-laying of indigenous chicken ranging between 5.23 to 5.37 months. Molla [15] and Melesse, et al. [28] reported average age at the first laying of 6.60 months and 6.69 months in Gomma Woreda, Jimma Zone in different agro-ecologies and around the villages of Dire Dawa Town, respectively which is comparable with the finding of the current study. According to Dana, et al. [29], birds attain egg-laying age at 5 months in Lume, Ada, and Akaki Woreda. Age at first egg ranged between 5-6 months in south Tunisia [30]. Sonaiya and Swan [31] also reported that indigenous village birds in Ethiopia attain sexual maturity at an average age of seven months which is in disagreement with the result of the current study. The mean age at first egg and slaughter age of pullet were significantly (P<0.01) affected by AEZ of the study area.
Mean number of clutches per year were 3.1 (3.09, 3.09 and 3.03 for highland, midland, and lowland agro-ecologies, respectively). This disagrees with the national average (4.00) reported by CSA [17] and lower than the result of Moges [32] who reported a number of clutches per year of 3.83 for local chicken ecotypes in Bure Woreda, north-west Amhara. As Molla [15] reported an average number of clutches per year of 3.43 which is higher than the current finding and also higher than the result of Mogesse [24] who reported a maximum of 2 to 3 clutches/hen/year. The result of the current study is also lower than the mean value of 3.67 reported by Tadesse [23] and mean clutches of 5.2 indicated by Mamo [26].

Average eggs per hen per clutch of local chickens in the study area were 13.9 (13.54, 14.23, and 14.02 for highland, midland, and lowland agro-ecologies respectively). This is higher than the national average of 12 eggs reported by CSA [17]. As Mekonnen [16] also reported, eggs per hen per clutch of 14.9 in Dale, Wonsho, and Loka Abaya Woreda of Southern Ethiopia which is in line with the current study. According to Mamo [26] and Moges [32], average eggs per hen per clutch were 15.7 and 15.4 for local chicken ecotypes of Bure Woreda, North Amhara and Jamma Woreda, South Wollo, Ethiopia, respectively. It was also reported that the average number of eggs laid/clutch/hen ranged between 10 and 18 [20] and 9 and 19 [24]), in Mid Rift Valley of Oromia and Northwest Ethiopia respectively. The average slaughter age of cock in the study area was 6.22 (6.02, 5.76 and 6.45 for highland, midland, and lowland agro-ecologies, respectively). This is due to feed availability at midland like, maize and wheat. The average slaughter age of pullet in the study area was 5.2 (5.80, 4.63, and 5.45 for highland, midland, and lowland agro-ecologies, respectively). The average slaughter age of cock and pullet in the current study disagrees with GAIN [33], who reported that Ethiopian indigenous chickens reach slaughter at the age of 8 to 12 months in the village management system. In the current study average slaughter age of cock is less than reported by Molla [15] that the mean age at slaughter for indigenous cock chickens of Gomma Woreda is 8.62 months. As Aman, et al. [34] reported that in three agro-ecologies of SNNPR, indigenous chickens reach slaughter at 9.9 months. Also, greater than current finding average slaughter age of cock and pullet in western Tigray indigenous chickens reach slaughter at 4.66 and 4.5 months for cock and pullet chickens, respectively [35].

The age at maturity of the Sasso chickens was earlier with the shortest age to lay when compared to the genotypes studied. These findings are in close agreement with those of Aman, et al. [34] who observed that the Sasso chickens reared at Wolayita and Kembata zones of southern Ethiopia had a lower age at maturity when compared to the other exotic chicken genotypes. The present study on Sasso breed was comparable on age at first egg /month, number of eggs per clutch [36] with 5.17 month and 25.1±2.9 respectively. The slaughter age of Sasso breeds was lower or early than local contemporaries. This might be due to faster or higher feed conversion efficiency.

**Culling of chickens**

Regarding the culling practices, the majority (99.4%) of interviewed farmers reported that they practiced culling. From the total interviewed one respondent (0.6%) does not practice culling on their flocks. This result is higher than Fitsum [37] who reported 78.9% of households practiced culling and the rest 21.1% of the household was not culling their chicken in the central zone of Tigray Northern Ethiopia. Major factors of culling chickens from the flock in Ankober woreda are indicated in Table 9. Culling was practiced by all respondents in Ankober woreda due to various reasons. In Ankober Woreda, old age, poor productivity, sickness, and lack of broodiness are reported as reasons for culling by 78.9%, 29.4%, 9.4%, and 0.6% of respondents, respectively. Similar culling practice was reported by Moges, et al. [38] and Moges, et al. [39] in Bure Woreda, North West Ethiopia.

**Egg incubation**

In this result, artificial incubation is not practiced since artificial incubator facilities are unthinkable by the respondents of all study kebeles. Therefore, in all studies, kebeles incubation and hatching of chicken eggs are done by the broody hen. The study revealed that wet season was a non-preferred season of the year for eggs incubation and brooding of young chicks using broody hen because of poor survivability of young chick. The overall average frequency of brooding in the study kebeles was 2.56 times per year. The average number of eggs set to broody hen was 11.61 in the current finding, which was less than the report of Yisma and Kebede [10] in Kowet Woreda who found 12.50 in Menze Gera Mider, and 12.50 in Moretina Jiru Woreda. This may be related to environmental temperature. Similar to this report, Aklilu [40] in Horro reported 13.8 and Jarso 12 eggs were set for one hen per brooding. The current finding

### Table 8: Production and reproduction performance of village chicken in Ankober Woreda.

| Breeds          | Highland (Mean±SEM) | Midland (Mean±SEM) | Lowland (Mean±SEM) | Overall Mean | P[0.05] |
|-----------------|---------------------|--------------------|--------------------|--------------|---------|
| Local           |                     |                    |                    |              |         |
| Age at first egg/month | 6.19±0.111       | 5.81±0.076        | 6.22±0.086        | 6.1±0.09    | **      |
| clutch per hen per year | 3.09±0.05      | 3.09±0.03         | 3.03±0.02         | 3.1±0.03    | NS      |
| Average number of Eggs per clutch (no) | 13.54±0.34       | 14.23±0.29        | 14.02±0.28        | 13.9±0.3    | NS      |
| Slaughter age of cock | 6.02±0.06       | 5.76±0.06         | 6.89±0.11         | 6.22±0.08   | *       |
| Slaughter age of pullet | 5.80±0.13      | 4.63±0.10         | 5.45±0.11         | 5.3±0.11    | **      |
| Exotic (Sasso)  |                     |                    |                    |              |         |
| Age at first egg/month | 4.92±0.93       | 5.13±0.77         | 4.87±0.83         | 4.97±0.84   | **      |
| Average number of Eggs per clutch (no) | 23±0.53         | 26±0.27           | 22±0.21           | 23.67±0.34  | ***     |
| Slaughter age of cock | 5.1±0.08        | 4.7±0.03          | 4.9±0.06          | 4.9±0.06    | **      |
| Slaughter age of pullet | 5.27±0.21       | 4.43±0.07         | 5.17±0.14         | 4.96±0.14   | *       |

SEM= Standard Error of Mean, Ns= P>0.05, **=P<0.01, ***= P<0.001, *=P<0.05

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Table 9: The determinant factors for the culling of Chickens.

| Purpose                | Highland N=(46) | Midland N=(70) | Lowland N=(64) | Total N (%) |
|------------------------|-----------------|----------------|--------------|------------|
| Do you Practice Culling Bird? | Yes 46(100)   | 70(100)        | 63(98.4)     | 179(99.4%) |
|                        | No  0(0)        | 0(0)           | 1(1.6)       | 1(0.6%)    |
| Lack of Broodiness     | Yes 6 (13.1)    | 5 (7.1)        | 6 (9.4)      | 17(9.4%)   |
|                        | No 40(86.9)     | 65(92.9)       | 58(90.6)     | 163(90.6%) |
| Sickness               | Yes 6(13.1)     | 25(35.7)       | 7(10.9)      | 38(21.1%)  |
|                        | No 40(86.9)     | 40(56.3)       | 57(89.1)     | 142(78.9%) |
| Old Age                | Yes 11(23.9)    | 27(38.6)       | 15(23.4)     | 53(29.4%)  |
| Poor Productivity      | No 35(76.1)     | 43(61.4)       | 49(76.6)     | 127(70.6%) |

N = Number of Responses

Table 10: Division of household labor in Ankober Woreda.

| Parameters | R1 | R2 | R3 | R4 | Index |
|------------|----|----|----|----|-------|
| Mother     | 179| 1  | 0  | 0  | 0.399 |
| Father     | 0  | 3  | 2  | 175| 0.104 |
| Girl       | 1  | 176| 3  | 0  | 0.299 |
| Boy        | 1  | 0  | 174| 5  | 0.198 |

R1= Rank one; R2= Rank two; R3= Rank three; R4= Rank four

Despite all the regional differences in smallholder poultry production, one observation seems to remain the same, whether talking of smallholder households in Africa, Asia, or Latin America namely that the day-to-day management of poultry is undertaken by women, often with assistance from their children [45]. The finding is consistent with Justus, et al. [46] who reported that women were the majority (76%) with men representing only 24% of the sampled farmers keeping indigenous chickens in Western Kenya. A study carried out by Leta and Endalew [20] in Mid Rift Valley, Oromia, Ethiopia also revealed that the majority of village chicken production (92.4%) was owned by women and children.

Figure 3: Number of Egg incubates per hen and frequency of incubation per year.

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Agricultural extension services

Producers lack access to information on “best practices” for village poultry operations and also lack opportunities to build business skills [49]. The survey result revealed that about 90.6% of the farmers in the area had access to agricultural extension services (Table 12). Chicken owners in the highland had better access for extension services (97.8%) than that in midland (92.9%) and lowland (82.8%) related to infrastructures like road and distance between farmer house and Keble veterinary clinic. About 9.4% of the interviewed respondents in the woreda had no access to extension services (2.2% in the highland, 7.1% in the midland, and 17.2% in the lowland) attributed to lack of awareness for smallholder farmers.

The majority of the farmers (58.9%) received the service two times per month, whereas 20% and 12.2% received once and three–time per month, respectively. While the remaining 8.9% has no extension contact at all. As Mogesse [24] reported that 52.5% of the farmers in Northwest Ethiopia received agricultural extension services. A study conducted in Western Kenya [46] revealed that 42.5% of the smallholder farmers had access to the extension. A lower proportion (37.5%) of extension service was reported by Moges [32] in Bure Woreda of North Amhara.

Village chicken and egg marketing

Marketing characteristics of the study Woreda: In both time during at normal period of the year and at holiday period local chicken was costy than exotic (Sasso) chicken presented in Tables 13,14. Commonly price was higher during holiday time. Chicken and chicken products were sold in Ankober Woreda town. This market nearest to Debre Brehan and Addis Ababa and road accessibility and transportation is good. So, the producer could fetch a good price during the holiday. According to respondent’s, the price of chicken and egg is low during other period of the year but higher during holiday period of the year. This result is line with Moges, et al. [5] reported that the supply and demand of egg and chicken are not similar throughout the year. One of the purposes of keeping village chicken by the farmers is to purchase home consumption materials like salt, onion, others. Generally, they engaged in chicken production for fetch cash. This is similar to the report of Molla [15] smallholder village chicken owners sell their chicken and eggs to get income or cash.

Time of selling: The results obtained for selling time and price (Table 13) revealed that 90% of selling time was during holidays. However, 52.2% and 32.2% of respondents sold their chicken and eggs during specific weight gain of chicken and personal money requirements, respectively. The practice of selling of eggs and chicken indicated that higher proportion of the respondents, 70% were selling their eggs and chicken to retailers, and 20% of the respondents were selling their eggs and chicken at local shop keepers and 19.4% of the respondents were selling their eggs and chicken at village market. The majority of the respondents sell eggs and chicken according to their money requirement, respondents sell chicken and eggs using a calendar system to look for a good price during holidays. This reflected the fact that respondents preferred to sell at higher prices, as the price of eggs and chicken is highly related to holydays, and agreed to the reports of Mogesse [24], Dinka, et al. [25] and Williams [50].

Similar selling practice of eggs and chicken has been reported by Eskinder [51] and Khadait, et al. [52]. In the study area, the majority of respondents prefer egg and meat from local chicken to exotic chickens. The best for local chickens is attributed to better meat flavor and more deeply colored egg yolks [53]. However, at the village level, a significant difference

| Table 11: Purpose of keeping chicken in Ankober Woreda (% respondents). |
|---------------------------|-----|-----|-----|-----|
| Purpose                  | Response | Highland N=(46) | Midland N=(70) | Lowland N=(64) | Total N (%) |
| Sale                     | Yes | 46(100) | 50(92.9) | 57(91.1) | 173(96.1) |
|                         | No  | 0(0)    | 6(10.0)  | 7(11.3)  | 13(7.9)  |
| Home Consumption         | Yes | 21(45.7)| 28(40.0)| 30(46.9)| 79(47.8) |
|                         | No  | 25(54.3)| 52(60.0)| 24(53.1)| 91(52.2) |
| Scarify                  | Yes | 9(19.6)| 10(14.3)| 7(10.9) | 26(14.4) |
|                         | No  | 37(80.4)| 60(85.7)| 57(89.1)| 154(85.6)|

N = Number of responses

| Table 12: Agricultural extension services in Ankober woreda (%respondents). |
|---------------------------|----------------|---------------|---------------|-------------|
| Parameters Description    | Agro-ecology  |
|                         | Highland N=(46)| Midland N=(70)| Lowland N=(64)| Total N (%) |
| Access to Extension       | Yes | 45(97.8) | 65(92.9) | 53(82.8) | 163(90.6) |
| Services?                 | No  | 1(2.2)  | 5(7.1)   | 11(17.2)| 17(9.4) |
| Frequency of Service per Month |                       |               |              |             |
| One time per month        | No  | 0(0)    | 2(2.9)   | 0(0)   | 2(1.1) |
| Two times per month       | No  | 1(2.2)  | 5(7.1)   | 10(15.6)| 16(9.0) |
| Three times per month     | No  | 1(2.2)  | 5(7.1)   | 10(15.6)| 16(9.0) |
| Hear Information about Improved Poultry Practice | No | 0(0) | 2(2.9) | 0(0) | 2(1.1) |

N = Number of respondents

| Table 13: Price of village chicken and eggs on holiday. |
|---------------------------|---------------|---------------|---------------|---------------|
| Breeds                    | Highland (Mean±SEM) | Midland (Mean±SEM) | Lowland (Mean±SEM) | Overall Mean (Mean±SEM) |
|                          |                |                |                | P(0.05) |
| Local                     |                |                |                |           |
| Hens                      | 161.5±2.25d   | 149.4±2.30d    | 150.4±2.33d    | 153.8 ** |
| Cocks                     | 278.2±6.16c   | 234.4±4.02c    | 247.9±4.17b    | 253.5 *** |
| Pullets                   | 128.4±3.79c   | 111.7±2.23b    | 119.6±2.15b    | 119.9 *** |
| Cockerel                  | 207.3±9.45c   | 186.9±3.69c    | 191.5±3.11b    | 195.3 *** |
| Egg                       | 4.27±0.05d    | 3.45±0.06c     | 3.66±0.05b     | 3.8 *** |
| Exotic (Sasso)            |                |                |                |           |
| Hens                      | 140.3±3.21a   | 130.4±2.82b    | 143.6±2.09c    | 137.7 ** |
| Cocks                     | 254.7±2.23a   | 223.4±2.54a    | 239.18±2.11c   | 239.12 *** |
| Pullets                   | 100.3±1.47a   | 104.3±2.31b    | 113.28±3.27b   | 105.99 ** |
| Cockerel                  | 187.4±1.40a   | 183.4±1.93b    | 175.49±3.83c   | 182.11 *  |
| Egg                       | 3.25±0.09c    | 3.30±0.09b     | 3.44±0.07b     | 3.33 *** |

SEM = Standard Error of Mean, Ns = P>0.05, * = P<0.05, ** = P<0.01 and *** = P<0.001
in egg yolk color may not be expected between local and exotic chicken, thus such difference might be for flavor and taste of the egg from local chicken. However, one respondent (0.6%) had an equal preference for eggs of local and exotic chickens in study Woreda. As the common price of chicken is raised at the time of the holiday, the present study noted that the price of birds was statistically significantly ($P<0.001$) to highly significantly ($P<0.001$) affected by agro ecology. The price of birds including egg was higher in the highland area during both the time holiday and another period of the year. From different chicken, type cock was expensive the other at both periods of the year. In the study area, the local chicken was higher than exotic (Sasso) including its egg. This might be as a result of egg and meat test (Figure 4).

**Mode of transportation:** The modes of chicken transportation by farmers in all agro-ecologies are shown in Tables 15,16. Chickens transportation was, embracing by hand for one or two birds, for more than two birds farmers used a hanging by hand/on the shoulder with the stick to carry the chickens, using pack animals 58.3%, 40.6%, and 1.1%, respectively. For egg transportation, 49.4% of the farmers used straw, 50.6% grain placing in any container to protect the eggs from breakage. This was somewhat similar to Moges [32], the majority of chicken owners (66.4%) used hand carrying (using a piece of cloths with grains/straw) to transport eggs to urban and local markets in Bure Woreda, North–West Amhara.

Generally, comb types, sex, body weight, and plumage colors determined the price of cocks during the ordinary market and holiday market in the study area. This result was similar to the reports of Alem and Yayneshet [54] which revealed that most chicken farmers considered plumage color, sex, body weight and comb type as main determinant factors in the selection of birds for production, consumption and marketing purposes in central Tigray, Northern Ethiopia. Similarly, Moges, et al. [5] reported that most respondents in Bure and Fogera Woredas considered plumage color and comb type as the main

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### Table 14: Price of village chicken and eggs in another period of the year.

| Agro-ecology | Breeds | Highland (Mean±SEM) | Midland (Mean±SEM) | Lowland (Mean±SEM) | Overall Mean (Mean±SEM) |
|--------------|--------|---------------------|-------------------|-------------------|------------------------|
| **Local**    | Hens   | 130.65±1.21a        | 109.43±1.25b      | 117.34±2.44c      | 119.14±1.22***         |
|              | Cocks  | 225.43±5.14a        | 192.71±3.20b      | 201.64±3.75c      | 206.67±3.20***         |
|              | Pullets| 100±3.39a           | 87±1.43a          | 93.20±1.34b       | 93.4±1.34a**           |
|              | Cockerels| 172.72±1.27a       | 156.57±4.07b      | 162.34±3.20a      | 163.9±1.27a***         |
|              | Egg    | 3.71±0.05a          | 2.99±0.06a        | 3.05±0.04a        | 3.25±0.05a***          |
| **Exotic (Sasso)** | Hens  | 117.98±3.26a        | 106.44±2.76b      | 108.23±2.76b      | 110.88±3.26a**         |
|              | Cocks  | 193.15±5.27a        | 184.51±5.34b      | 189.47±3.06a      | 189.04±5.34a***        |
|              | Pullets| 88.67±3.07a         | 81.24±1.89        | 76.03±2.65a       | 81.98±3.07a NS         |
|              | Cockerels| 146.38±4.16a       | 157.57±3.24a      | 152.02±4.16a      | 152.02±4.16a *         |
|              | Egg    | 3.12±0.08a          | 2.50±0.31a        | 2.75±0.12a        | 2.79±0.12a***          |

SEM = Standard Error of Mean, Ns = P>0.05, * = P<0.05, ** = P<0.01 and *** = P<0.001

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### Table 15: Selling time and consumer preference.

| Parameters          | Description                          | Highland N=46 | Midland N=70 | Lowland N=64 | Total N(%)  |
|---------------------|--------------------------------------|---------------|--------------|--------------|-------------|
| **Time of Selling** | Specific Wight gain                   | 3(6.52)       | 2(2.9)       | 1(1.6)       | 6(3.3%)     |
|                     | Personal money requirement            | 6(13.04)      | 3(4.3)       | 3(4.3)       | 12(6.7%)    |
|                     | During Holiday and Festivals          | 37(80.4)      | 65(92.9)     | 60(93.7)     | 162(90%)    |
| **Selling Poultry Product** | Village Market                        | 7(15.2)       | 8(11.43)     | 3(4.7)       | 18(10%)     |
|                     | Local Shop Keepers                   | 15(32.6)      | 13(18.6)     | 8(12.5)      | 36(20%)     |
|                     | Retailers                            | 24(52.2)      | 49(70)       | 53(82.8)     | 126(70%)    |
| **Consumer Meat Preference** | Meat from Village Chicken            | 45(97.8)      | 70(100)      | 64(100)      | 179(99.4%)  |
|                     | Meat from Improved Chicken           | 0(0)          | 0(0)         | 0(0)         | 0(0%)       |
|                     | Equally Preferred by the Consumer    | 1(2.2)        | 0(0)         | 0(0)         | 1(0.6%)     |
| **Means of Chicken Transport** | Embracing by Hand                   | 24(52.2)      | 44(62.9)     | 37(57.8)     | 105(58.3%)  |
|                     | Hanging by Hand/on Shoulder          | 21(45.7)      | 25(35.7)     | 27(42.2)     | 73(40.6%)   |
|                     | Pack Animal                          | 1(2.2)        | 1(1.4)       | 0(0)         | 2(1.1%)     |
| **Death during Transport** | Yes                                 | 2(4.3)        | 2(2.9)       | 1(1.6)       | 5(2.8%)     |
|                     | No                                   | 44(95.7)      | 68(97.1)     | 63(98.4)     | 175(97.2%)  |
| **Variation of Chicken Price** | Feather Color                       | 30(66.6)      | 40(57.1)     | 42(65.6)     | 112(62.2%)  |
|                     | Comp Type                            | 25(55.5)      | 4(5.7)       | 1(1.4)       | 30(16.7%)   |
|                     | Body Weight                          | 4(8.5)        | 6(8.6)       | 4(6.3)       | 14(7.8%)    |
| **Means of Eggs Transportation** | Sex                                 | 5(7.8)        | 20(28.6)     | 10(15.6)     | 35(19.4%)   |
|                     | Transport with grain                 | 28(60.9)      | 30(42.9)     | 33(51.6)     | 91(50.6%)   |
|                     | Transport with straw                 | 18(39.1)      | 40(57.1)     | 31(48.4)     | 89(49.4%)   |

N = Number of respondents

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**Table 16**: Major Constraints of village chicken production in Ankober Woreda (% respondents).

| Constraints | Agro-ecology | Highland (N=46) | Midland (N=70) | Lowland (N=64) | Total N (%) |
|-------------|--------------|-----------------|----------------|----------------|-------------|
| Housing Problem | Yes | 24 (52.2) | 33 (47.1) | 18 (28.1) | 75 (41.7%) |
| | No | 22 (47.8) | 37 (52.9) | 46 (71.9) | 105 (58.3%) |
| Lack of Extension Service | Yes | 13 (28.3) | 19 (27.1) | 6 (9.4) | 38 (21.1%) |
| | No | 33 (71.7) | 51 (72.9) | 58 (90.4) | 142 (78.9%) |
| Lack of available Market | Yes | 12 (26.1) | 6 (8.6) | 6 (9.4) | 24 (13.3%) |
| | No | 34 (73.9) | 64 (91.4) | 58 (90.6) | 156 (86.7%) |
| Diseases | Yes | 44 (95.7) | 39 (55.7) | 44 (68.8) | 127 (70.4%) |
| | No | 2 (4.3) | 31 (44.3) | 20 (31.2) | 53 (29.4%) |
| Predators | Yes | 22 (47.8) | 56 (80) | 52 (81.2) | 130 (72.2%) |
| | No | 24 (52.2) | 14 (20) | 12 (18.2) | 50 (27.8%) |
| Feed Shortage | Yes | 6 (13.1) | 6 (8.6) | 0 (0) | 12 (6.7%) |
| | No | 40 (86.9) | 64 (91.4) | 64 (100) | 168 (93.3%) |

**Major constraints of village chicken production**

In this study, predators (72.2%), disease (70.6%), housing problem (41.7%), lack of extension service (21.1%), lack of available market (13.3%), and shortage of feed (6.7%) were the common constraints of village chicken production. Similarly, predator and disease were the main constraints of indigenous chicken production at farmer management conditions in Lemo Woreda of Hadiya zone in southern Ethiopia [55]. Predators in the present study area are higher than 12% in East Shewa, Ethiopia reported by Tegegne [8]. However, the present study was lower than 89.17% of the poultry owners facing the problem of attack of predators reported by Khandait, et al. [52] in Bhandara woreda. Predation was common during the rainy season due to high density of vegetation cover, this attract and provided cover for predator animals. Common predators were dogs, cats (domestic or wild) in this study area agreed with Khandait, et al. [52].

On the other hand, overall average of 70.6% of respondents constrained by disease in the study area agreed with the reports of Molla [15]. She also observed that in the backyard poultry production system, diseases are the major limiting factor to the production. This disease effect was higher than the 33.1% effect of the disease reported by Tegegne [8] in East Shewa, Ethiopia. However, the present disease effect was lower than the 100% effect of the disease reported by Khandait, et al. [52] in Bhandara Woreda. Lack of extension service was not constraint in all kebeles and dis agreed with the report of Moges, et al. [38] in Ethiopia and Khandait, et al. [52] in India [53–55].

**Conclusion**

In general, the husbandry practices by poultry owners in the Woreda were unimproved. The predominant poultry production practice in area was traditional scavenging family poultry system with only a handful of supplementation of locally grown and purchased grain mainly maize, sorghum, and wheat once a day. Chickens were busy seeking their food around the home with no guaranteed protection against bad weather, predators, and disease-causing agents. In the traditional rural setting dominated by smallholder farms, poultry has little shelter, are allowed to scavenge for feed. The result of the study also revealed that NCD and mites were the most dominant poultry diseases affecting poultry keeping in the area. Farmers practiced various measures to control poultry diseases in the area. The most common ingredients utilized by the interviewed farmers were lemon juice, garlic, green pepper, salt, and mix water. Lack of access to veterinary services contributed to the loss of chickens to a greater extent according to the farmers during a group discussion with key informants. The production performance of village chickens in the woreda was generally medium as they receive attention from the owners. Therefore, training and technical support to both farmers and extension staffs on supplementary feeding, watering, housing, and health care should be provided. In addition, appropriate intervention is needed to control diseases and predators to minimize the loss of chicken.

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