

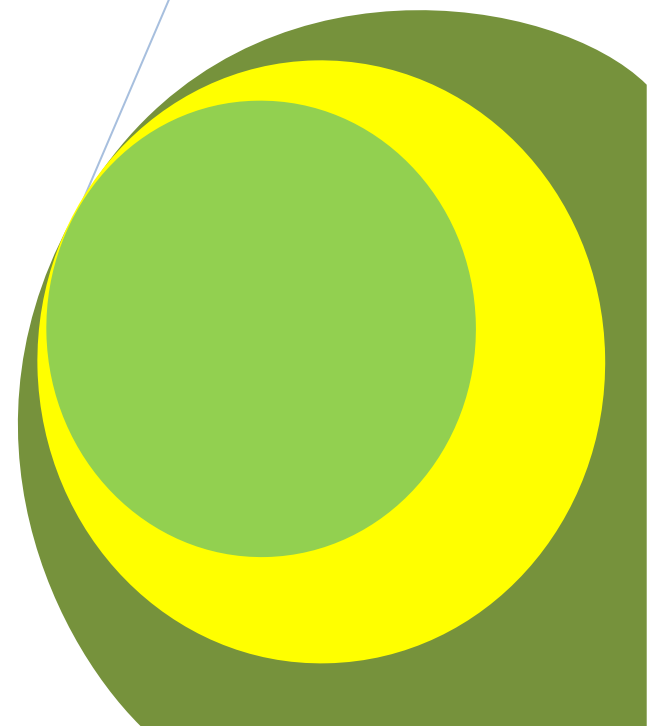


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Assessment of Chicken Production under Farmers Management Condition in East Gojam Zone, Amhara Regional State, Ethiopia

By

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Research Article

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ABSTRACT

The survey was conducted in Eastern Gojjam Zone of Amhara regional state, North Ethiopia from January to June, 2013 to generate base line information on chicken production under farmer's management condition. Of total, 83% of respondents practiced free ranging type chicken production system with conditional feed supplementation and frequent water supply. Despite the largest concern was given for female households, males also involved in chicken management activities aiming for household consumption and income generation. The mean flock size per household was found to be 13 and 5 for local and crossbred chickens, respectively. Almost all farmers in the tested districts provided night shelter for their chickens, and majority (91%) of them have experience of culling undesired chicken from the flock. From this study, the mean number of eggs laid was 18 eggs per/hen/clutch. Most chicken keepers in the study area had experience of selecting and incubating eggs for hatching using broody hens as a sole means of natural incubation. The average number of eggs set for incubation was 13 per broody hen, from which relatively fair number (83%) of chicks were hatched and 67% were grown well. Seasonal disease outbreak (100%) followed by predators (89%) was considered the largest threat to chicken production. Moreover, traditional management (83%), limitation of improved breed availability and lack of extension and chicken health services (86.7%) were the major constraints of chicken production in the study area. Therefore, holistic extension services such as applying breed and management improvement methods, besides to supplying chicken health service strategies are highly recommended in the study area for further improvement of chicken production under farmer's management condition.

Key words: Chicken diseases, Chicken breeds, Chicken production, Free-ranging, Management.

INTRODUCTION

Poultry production is an important economic activity in Ethiopia. Besides to its economic and social values, it occupies a unique position in terms of high quality protein food contribution to rural smallholder farming families in Africa and particularly in Ethiopia (Sonaiya et al., 1999; Tadelle and Ogle, 2001). Both poultry egg and meat enrich and contribute to a well balanced diet to satisfy human needs. An average adult human needs about 65g of protein/day, of which only 10% needs to be protein of animal origin (Tadelle et al., 2003a). Approximately 20% of protein consumed in developing countries originates from poultry (Askov and Dolberg, 2002).

The total population of chicken in Ethiopia is about 50.38 million comprising cocks, cockerels, pullets, laying hens, non-laying hens and chicks (CSA, 2012). Of which, 96.9%, 54% and 2.56% were reported to be indigenous, hybrid and exotic chicken breeds, respectively. Despite the high number, their contribution to farm households and national income is still very low (2-3%) and the annual growth rates in egg and meat output were estimated about 1.0 and 2.6% as compared to the sub Saharan Africa countries, 5.7and 6.8%, respectively (Negussie, 1999). This might be due to shortage of poultry feed and nutrition under both rural smallholder and large-scale systems in the country (Tadelle et al., 2003b). Moreover, the productivity of birds under the rural production system is very low interims of egg production, size of eggs, growth rate and survivability of chicks (Teketel, 1986), which may be attributed to lack of improved poultry breeds, the presence of predators, the high incidence of diseases, poor feeding and management followed by farmers (Alemu, 1987).

Although large number of chicken were recorded in East Gojjam Zone, which is about 1.15 million (CSA, 2012), their current production performance has not studied and documented yet and their attributes are unknown by stalk-holders. Consequently, this study was initiated to generate baseline information about chicken production and productivity performances, and use patterns under farmer's management condition.

MATERIALS AND METHODS

Description of the Study Area

The study was conducted in Eastern Gojjam Zone of Amhara Regional State. The area lies at 10° 20' North latitude and 37° 43' East longitudes, and at an altitude range of 500-4154 m.a.s.l. The annual rainfall of the area ranges from 900-1800mm and mean minimum and maximum temperature of 7.5°C and 25°C, respectively. Mixed crop-livestock production system is a common agricultural practice in the area; even smallholder traditional poultry production is practiced in each village and household level. The livestock population of the area include 1.84 million cattle, 1.14 million sheep, 0.4 million goats, 0.09 million horses, 0.36 million donkey, 0.014 mule, 1.15 million poultry and 0.13 million hives (CSA, 2012).

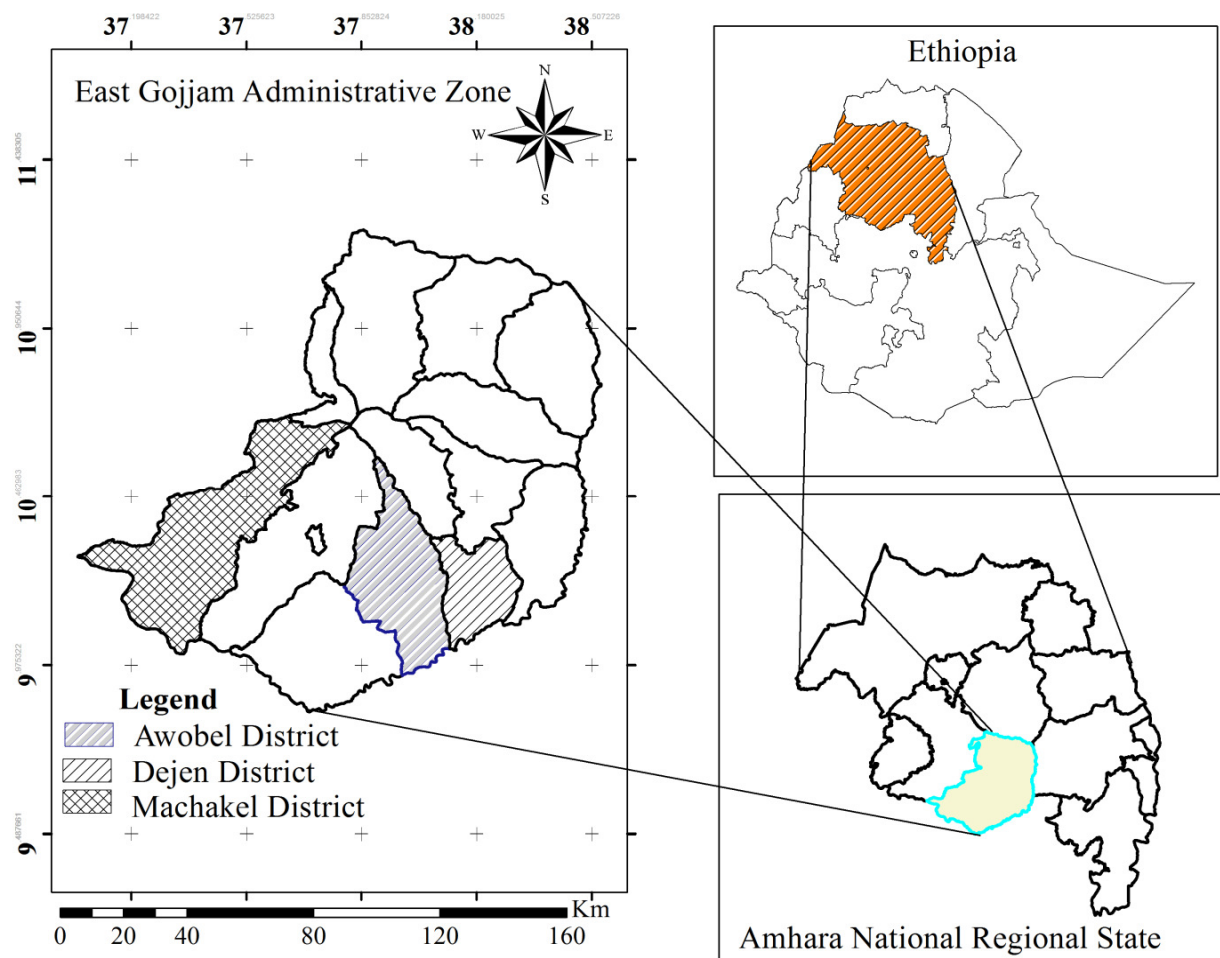


Figure: Map of the Amhara National Regional State, East Gojjam Administrative Zone and the Study Districts

Sampling Methods and data collection

The survey was conducted in three districts (Dejen, Awobel and Machakel) of East Gojjam Zone, from January to June, 2013, which are purposively selected based on their potentiality of chicken production. Similarly a total of 9 peasant associations, three from each district were selected. A total of 90 households, 10 from each peasant associations, were selected purposively based on their poultry production experiences, possessing at least 10 chickens.

A cross-sectional study design was used to carry out the study to collect data on all relevant information from the existing chicken management condition using well structured questionnaire. The questionnaire focused mainly on chicken's management practices, flock production performances, use patterns of products, problems prevailing in chicken production and other related issues of poultry production. Secondary data, like introduction of poultry technology and extension services were collected from the respective Agricultural and Rural Development Office.

Moreover, In order to obtain actual information in common aspects of poultry production such as egg color flock composition and routine management practices, close visits or personal observations around the residential quarters of the selected peasant associations were performed. The core data collected using questionnaires were analyzed by using descriptive statistics of SPSS version 20 (SPSS, 2001). Tukey test were used to locate Significant mean differences.

RESULTS AND DISCUSSION

Purpose of keeping chickens

The result of this study indicated that keeping of chickens is widely practiced in the study area. Almost every farmer keep chicken in varying number of flock size aiming of producing egg and meat for household consumption, income generation and hatching and rearing of chicks for replacement of flock. In line with this study Tadelles et al. (2003b) and Halima et al. (2007) with their studies in different areas reported that, income generation and household consumption are the main production objectives of keeping village chicken in Ethiopia.

Households Characteristics of Selected Farmers and Gender Involvement

General characteristics of the respondents indicated that Majority (96.7%) of the respondent farmers belonged to the orthodox religion. Of which, (76.7%) were the male households and the rest were female (Table 1). The average family size of sample respondents is 5.11 (ranged 1-10), which is nearly similar to the national average of 5.2 persons (CSA, 2003) and 5.4 for northwest Amhara (Halima et al., 2007). However, the present finding is smaller than the findings of Fisseha et al. (2007) and Asefa (2007) who reported 6.2 and 7 persons per household for the Burie district in Amhara region and Awassa Zuria *woreda* in the SNNPR, respectively.

Table 1: Demographic characteristics of respondent households

Variables	Responses	Frequency	Percent
Sex	Male	69	76.7
	Female	21	23.3
Education status	Illiterate	25	27.8
	Read and write	29	32.2
	Grade 1-8	24	26.7
	Grade 9-12	12	13.3
Farming system	Livestock production	5	5.6
	Both crop & livestock	84	93.3
	Others	1	1.1
Responsible family member to manage chicken	Females only	38	42.2
	Males only	4	4.4
	Both females and males	48	53.3

Furthermore, only 27.8% of the farmers were illiterate and the rest were just able to read and write, and majority (40%) of them have formal education background up to high school level (Table 1). In almost all of the study areas, respondent farmers have an average of more than 7 and 2.5 years experience of keeping local and cross-breed chickens, respectively.

The survey result also indicated majority (93.3%) of the respondent farmers practiced mixed crop-livestock production activities. Concerning chicken management, both men and women (53.3%) share most of the poultry rearing activities, although the rest (42.2%) was given to the female family members in the households. In line with this result Fisseha et al. (2007) reported that, all members of the family in a household participate in chicken husbandry and management practice in one way or another.

Flock size of Respondent Farmers

The overall average flock size (Table 2) of respondent farmers in the study area was 13 chickens per household for local chicken and less than 5 cross-breed chickens per household. Similar to this study, Fisseha et al. (2010) was reported the mean flock size of 13 local chicken ecotypes per household in Bure district of Amhara region. An average flock size of 16 chickens was also reported in the central parts of Ethiopia (Tadelles et al., 2003b). Moreover,

the result of this study is in line with the work done by Gueye (1997) who reported that the flock size generally ranged from 5 to 20 fowls per African village household.

Table 2: Responses of farmers regarding flock size/hh (N=90)

Breed type	District	N	Min	Max	Mean±SD
Local chicken	Awobel	30	2	24	13.90±5.35 ^a
	Machakel	28	2	35	14.43±6.52 ^a
	Dejen	30	1	19	9.77±5.14 ^b
	Total	88	1	35	12.66±5.99
Crossbred chicken	Awobel	4	3	15	8.35±4.91 ^a
	Machakel	7	1	17	8.29±4.82 ^a
	Dejen	12	1	13	5.08±3.97 ^b
	Total	23	1	17	4.65±2.73

N= no. of respondents; Min=minimum; Max= maximum; SD= standard deviation.

^{a, b} Least square means with different superscript within a column are significantly different (P < 0.05).

As the result of this study, almost all respondent households keep all groups of chicken together without age separation. In agreement with this study, Samson and Endalew (2010) reported that 96% of the village chicken producers keep all ages of chicken together. Besides, Tadelle et al. (2003b) also reported that, chickens are widespread in Ethiopia and almost every rural family keeps all age groups of chicken, aiming for valuable source of family protein and income.

Chicken Management at the Farmer's Level

The results of the study (Table 3) showed that the dominant (83.3%) chicken production system in the study area is a free range or extensive type. chickens were managed mainly on free ranging, utilizing various feed sources searching by their own in the field, with conditional feed supplementation. However, some (16.7%) of the respondent farmers practice semi-intensive type of chicken management using fences around their homestead. This implied that farmers in the study area are going to change and improve chicken management practices i.e., 97.8% of them have future chicken production improvement plan mainly by improving the management activity as well as using improved chicken breeds.

Table 3: Responses of farmers regarding chicken management (N=90)

Parameters	Responses	Frequency	Percent
Production system	Traditional	75	83.3
	Semi intensive	15	16.7
Stock source	From local market	59	65.6
	From own stock	26	28.9
	Others	5	5.5
Highest production cost incurred	Purchasing of stock	43	47.8
	Purchasing of feed	42	46.7
	For medication	5	5.6
Money source to manage chicken	Sailing of egg and chicken	34	37.8
	Sailing of crop	47	52.2
	Sailing of other livestock	5	5.5
	Family source	4	4.4
Future production improvement plan	Yes	88	97.8
	No	2	2.2
System of future improvement	Changing the existing breed	18	20.0
	Improving management	5	5.5
	Both breed & mgt. improvement.	67	74.4

N= no. of respondents

This result is in agreement with various research reports done in different areas. Tadelle et al. (2003b) and Solomon (2004) in their study reported, in Ethiopia the smallholder chicken production system is characterized by keeping under free range system with the major feed sources of insects, worms, seed and plant materials. Similarly, Dwinger et al. (2003) reported that, family poultry production in Africa survives by scavenging with limited supplementation of household waste feed and grain. In this study, majority (65.6%) of the farmers respond that the main source of their chicken stock is purchasing from local market, and thus they incurred around 47.8 and 46.7% of the major production costs for purchasing of stock and supplementary feed, respectively.

Housing and culling management of chicken

Housing facilities for rural chicken are usually made of small wooden structures aimed at Keeping the birds at night and thus, variety of night sheltering of chicken are practiced. According to the result of this study (Table 4), almost all farmers provided night shelter for their chickens like in separate sheds purpose-made for chickens 41.1 %, using perch 24.4%, using basket 15.6%, in the main house at one of the rooms 11.1% and the remaining 7.8% use either part of the kitchen. From the result it could be understood that the housing management in the study area is not satisfactory for the well being of chicken and their products management, and thus it needs improvement. In support of this result, Dwinger et al. (2003) reported that in some African countries, a large proportion of village poultry mortality accounted due to nocturnal predators because of lack of proper housing.

As the chicken farmers replied, chickens were confined only during the night and they move freely during the day, thus 65.6 % of the households clean the chickens' house once per day, while as 12.2 % and 21.1% of the owners cleaned it twice and one times per week, respectively (Table 4). This result is in agreement with the survey undertaken by Halima et al. (2007) in northern Ethiopia who reported 74.02 % of the households cleaned their chickens' house once per day, while 11.66 % of the owners cleaned it twice per day.

Table 4: Responses of farmers regarding housing and culling experiences (N=90)

Parameters	Responses	Frequency	Percent
Night shelter of chicken	In kitchen	7	7.8
	In main house at one of the rooms	10	11.1
	Using poultry houses	37	41.1
	On perch in the main house	22	24.4
	Using basket in the main house	14	15.6
Cleaning frequency of chicken house	Daily	59	65.6
	Two times per week	11	12.2
	One times per week	19	21.1
	Once per two weeks and above	1	1.1
Culling experience of undesired chicken	Yes	82	91.1
	No	8	8.9

The result of the study (Table 4) also indicated that majority (91%) of the respondents experienced in culling of unwanted or less productive chickens from their flock. According to the respondent farmers, the basic reasons for culling of chicken include less productivity (57.8%), old age (28.9%) with an average culling age of 3.5 years and infected with disease (13.3%). Most of the farmers (90%) sold the culled chicken for income generation purpose. In support of this study, Halima (2007) reported that about 74.7% of the reasons for culling of chicken in North West Ethiopia are poor productivity, old age and sickness as a whole.

Feeding and watering experience of farmers

The results of the study showed that all (100%) of the respondent farmers practiced in providing supplementary feed to chicken, which is usually offered 56.7% once per day, 34.4% twice per day and the remaining 8.9 % provide supplementary feed more than twice per day (Table 5). This result implied that although the supplementary feed is not satisfactory in terms of quality and quantity, there is a good accomplished of supplementing their chicken in order to improve the productivity performance. According to the response of the chicken farmers 53.3 % and 46.7% of them use household by products and purchased grains from local market, respectively to supplement their chicken. In line with this study, the work done by Halima et al. (2007) in northern Ethiopia indicated that 96.8% of the farmers supplied partial supplementation of feeds and 95.5 % of the feed was produced locally.

Majority (91.1%) of them provide supplementary feed by throwing on the ground to feed in groups without age separation. However, some of the farmers less than 9% of them, who mainly practicing semi-intensive type of chicken management, use locally prepared materials like stone trough, plastic trough, wooden trough, etc. to provide supplementary feed.

Almost all farmers provide water for their chickens; however the frequency of provision per day varies mainly based on the availability of labor, water and their understanding label about the use of water. According to the response of respondents 27 % and 62% of them were filling the varying types of watering troughs (Table 5) twice and more than two times per day, respectively for unlimited access. The major water sources for chickens in the study area are pond and deep well water (39%) and river water (36.7%). Majority of the respondents (64.4%) experience daily cleaning of watering trough and others in varying times per week and depending on the conditions.

Table 5: Responses of farmers regarding Feeding and watering experiences (N=90)

Parameters	Responses	Frequency	Percent
Types of supplementary feed	House hold by-product	48	53.3
	Grains from local market	42	46.7
Supplementary feed provision per day	One times only	51	56.7
	Two times	31	34.4
	Three times and above	8	8.9
Way of Supplementary feed provision	Using locally prepared feeding trough	8	8.9
	Throwing on land to feed in groups	82	91.1
Water sources	Tap water	21	23.3
	Pond and deep well water	36	39
	River water	33	36.7
Type of watering trough	Broken part of clay	29	32.2
	Part of plastic equipments	38	42.2
	Purchased watering trough	2	2.2
	Other types	21	23.3
Frequency of water supply	Once per day	9	10
	Twice per day	25	27.8
	Three times per day	36	40.0
	Four times per day	20	22.2
Frequency of trough cleaning	Daily	58	64.4
	Once in two days	8	8.9
	Once in three days	7	7.8
	Once in four days	3	3.3
	Once per week	1	1.1
	Depending on the condition	13	14.4

Egg production and hatching potential of chicken

From the present study it is indicated that the average number of eggs laid was 18 eggs per clutch ranging from 10 to 32 per hen; usually the maximum is from cross breed chickens (Table 6). This study revealed a range of four-six clutches was shown per hen per year in almost all of the study areas.

From the survey result, it is understood that exclusively natural incubation and hatching is practiced by all (100%) of chicken producers. The Average number of eggs set for incubation was 13 ranging from 10-20 per hen (Table 6), from which relatively fair number (83%) chicks were hatched. This result is in line with the work done by Samson and Endalew (2010), who reported that productive hens lay on average 10-18 eggs per clutch and 7-15 eggs were incubated using a broody hen from the incubated eggs 5-10 chicks hatched per clutch.

Table 6: Responses of farmers regarding egg production and hatching (N =90)

Parameters	District	N	Min	Max	Mean± SD
No of eggs layed per clutch	Awobel	30	13	30	17.50 ^a ±3.99 ^a
	Machakel	30	14	25	17.50±2.66 ^a
	Dejen	30	10	32	18.50±4.60 ^a
	Total	90	10	32	17.83±3.82
Average no of eggs set per hen for hatching	Awobel	29	11	20	14.17a±2.16 ^a
	Machakel	30	10	16	13.07b±1.62 ^b
	Dejen	30	9	16	12.40c±2.30 ^c
	Total	89	10	20	13.20±2.15
Percent of chicks hatch	Awobel	29	60	93	80.48±7.11 ^b
	Machakel	30	67	91	82.07±6.65 ^b
	Dejen	30	60	100	85.87±8.79 ^a
	Total	89	60	100	82.83±7.83
Percent of Chicks grown up to marketing	Awobel	29	50	80	65.17±10.12 ^a
	Machakel	30	48	80	63.43±10.44 ^a
	Dejen	30	42	100	69.10±13.22 ^a
	Total	89	42	100	65.91±11.48

N= no. of respondents; Min=minimum; Max= maximum; SD= standard deviation.

a, b, c Least square means with different superscript within a column are significantly different (P < 0.05).

Despite different colored eggs were observed, white (65.6%) were found to be dominant in almost all of the study areas. From this study, it was also understood that almost all of respondents experienced in practicing exclusively natural incubation and hatching, besides majority of them (75.6%) used different egg selection methods to increase hatchability, from which 46.7% used age and size of an egg, 21.1% and 7.8% used only egg size and age of an egg, respectively (Table 7). In this regard, relatively, lately laid and larger sized eggs are selected for natural incubation. This result indicated that majority of the farmers have some knowhow to improve hatchability of chicks. The result also further indicated that respondent farmers used various locally prepared egg setting equipments, namely 85.6% used equipments made from bamboo, twigs, wood or grass, and the rest 14.4% used equipments made from Mud.

Table 7: Responses of farmers regarding Hatching and related Activities (N=90)

Parameters	Responses	Frequency	Percent
Major color of eggs laid	White	59	65.6
	Black brown	9	10.0
	White brown	22	24.4
Hatching experience of house hold	Yes	89	98.9
	No	1	1.1
Egg selection experience for hatching	Yes	68	75.6
	No	22	24.4
System of egg selection	Egg size	19	21.1
	Age of an egg	7	7.8
	Both size and age of an egg	42	46.7
	No system used	22	24.5
Egg setting equipments for hatching	Equipments made from mud	13	14.4
	Equipments made from bamboo, twigs, wood or grass	77	85.6

Extent of extension service in the study area

In the study area the extension service for the improvement of livestock production in general and poultry production in particular found to be weak. Little emphasis has given to livestock and poultry production activities. The result of this research indicated that only some (13.3%) of the respondents utilize the service with the limited extent. However, majority (86.7%) of the respondents do not find extension services from any stakeholders mainly from development agents. This might be due to various reasons, specifically lack of awareness about the usefulness (56.7%), not need the service (18.9%) and lack of availability of the service (12.2%).

Similar to this study, Alemu and Tadelles (1997) reported that the extension linkage between the research output and the ministry of agriculture and the farmers are found to be extremely weak, thus in general there is no consistent feedback to the research. Fisseha et al. (2007) also reported that lack of access to extension agents for chicken farmers is one of the main reasons for the lower extension service in Burie district of Amhara region.

Constraints of poultry production in the study area:

The most important constraints impairing the existing chicken production system under farmer's management condition in the study area in their order of significance were disease, lack of veterinary health service, traditional management system with limited feed supplementation, poor housing and no access of improved breeds with limitation of extension service. Above all, the very less emphasis given to the livestock production sector in general and chicken production in particular by the concerned bodies was found to be the prominent drawbacks of poultry production in the study area. Similar to this result, Wonda et al. (2013) reported that disease (1st), predators (2nd), shortage of supplementary feeds (3rd), poultry housing problem (4th) and lack of veterinary health and extension services (5th) are the most important constraints of poultry production in village chicken production.

In this study, all of the respondents emphasized diseases as the biggest constraint to improvement of their chicken flocks. Among the diseases of village chickens, respondents rated Newcastle Disease, locally "Fengel" (100%) as the most devastating, and they explained it as highly discouraging to them not being able to sustain in chicken production activity. This result is in line with the reports of Alemu and Tadelles (1997) and Fisseha et al. (2007) who indicated that the major problem impairing the existing production system in Ethiopia is the high incidence of Newcastle disease. Aberra and Tegegne (2007) also indicated that Newcastle disease and fowl cholera are the major problems limiting chicken production in Ethiopia.

Although availability of scientific medication for their chicken is very limited, most of the households used traditional medicines for treating sick birds. Among the control methods of poultry disease, local plants like "Feto" (*Lipdum sativum*) seed powder, "Endod" (*Phytolacca dodecandra*) leaf juice, "Rate" leaf juice, "Simiza" leaf juice mixing with water and or feed and providing to their chicken are some of the indigenous remedies that farmers are practicing against NCD.

External parasites like "Kinikin" and predators like Shelemetimat, cat and Wild birds (locally called "chilfit") are some of the limiting factors of poultry production in the study area; however, their effect is not as such significant, when compare to Newcastle disease, and their negative effects are prevented by various indigenous measures.

CONCLUSION AND RECOMMENDATIONS

Chicken production is an integral part of livestock production system in the study area. Almost every farmer in each village practices aiming mainly for production of protein rich foods, egg and meat, and generating of small disposable cash income to fulfill various household needs. Free ranging type of Chicken production is extensively (83%) practiced, and is characterized by the use of predominantly indigenous chicken breeds with low input-low output levels. A range of factors such as traditional management, limitation of supplementary feeds, low genetic potential for productive traits, frequent disease outbreak effects causes high mortality rate and the apparent low output level.

Apart from this, lack of efficient extension and improved veterinary services, poor management practices interims of feeding and housing, and low genetic potential of the indigenous stock are highly emphasized constraints, which contribute to the low level of productivity of chicken under farmer's management condition in the study area. However, the availability of high demand towards chicken and chicken products in villages and local markets is considered as good opportunity to the chicken farmers.

Therefore, appropriate intervention in chicken disease and predator control activities, breed improvement strategies, providing frequent extension services interims of regular Training to farmers focusing on disease prevention, improved housing, feeding and watering of chicken, product handling and proper marketing are highly recommended so as to improve productivity of chicken and being benefited from the existing market and high demand of products.

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