Acta Entomology and Zoology

E-ISSN: 2708-0021
P-ISSN: 2708-0013
https://www.actajournal.com
AEZ 2023; 4(1): 48-54
Received: 25-12-2022
Accepted: 31-01-2023

Demelash Kefale
Alage TVET Collage, Department of Animal Science, P.O. Box 77, Alage, Ethiopia

Tsegaye Mitiku
Alage TVET Collage, Department of Animal Health, P.O. Box 77, Alage, Ethiopia

Corresponding Author:
Demelash Kefale
Alage TVET Collage, Department of Animal Science, P.O. Box 77, Alage, Ethiopia

Assessment on backyard chicken feeding practices and health management in Fogera district Amhara region, Ethiopia

Demelash Kefale and Tsegaye Mitiku

DOI: https://doi.org/10.33545/27080013.2023.v4.i1a.96

Abstract
The study was conducted in Fogera District of South Gonder Zone of Amhara Region of Ethiopia, with the study objective of generating baseline information and assessment on backyard chicken feeding practices and health management system of chicken in Fogera District. Two Kebeles (Quar Abo and Quar Michel) were selected purposively and a total of 15 households were randomly selected per each Kebele and totally, 30 randomly selected households from two Kebeles were included in the study area. The data collected was analyzed by using Microsoft exce. The highest proportions of respondents, about 53.33% were male whereas the remaining (46.67%) were female. In the study area (40%) of the house hold young age from (20-40), 42-62 age of house hold has 43.33% whereas>62 age of house hold has 16.67%. The result of the study indicated that the dominant flock structure in the study area were layers which account (6.73±2.89), pullets (3.96±2.31), cocks (2.46±1.70), cockerels (1.25±0.53) and chicken (3.33±1.98).The important of chicken production was household consumption (13.33%), income generation or sell (40%) and 46.67% for both consumption and selling purpose their chicken and egg during holidays. Our survey result showed that the highest proportion of respondents provided supplementary feed like, maize (20%, Rice (60%) and sorghum (20%) in addition to scavenging and the rest were scavenging only. The common feed source in the study areas are scavenging (13.33%), scavenging with supplementary feeding (23.33%), purchase from the market (26.67%) and 40% other like use at home. We conclude village chicken play a vital role in the human livelihoods and contribute to food security of the rural communities. In the study area the respondents most of the time feeding system in the ground within the group, so better to use the Federer place and provide feeds by separating of chicken based on the age.

Keywords: Backyard chicken, feeding practices, health management and Fogera

1. Introduction

1.1 Back ground of the study

Poultry production is widely practiced in Ethiopia, almost every farmstead keeps poultry for consumption, cash income, religious and cultural thought [1]. Poultry production has an important socio economic role in developing countries [2]. Poultry production system in Ethiopia is indigenous and an integral part of farming system and predominantly prevailing in the country and it is characterized by small flock minimal input, periodic devastation, with short lifecycle, quick turn over [3]. Ethiopia has large population of chickens estimated to be 50.38 million with native chickens of non-disruptive breed, with regard to breed, 96.9 percent, 0.54 percent and 2.56 percent of the total poultry are reported to be indigenous, hybrid and exotic respectively [4]. Simple rearing in backyard with inadequate farming and health care with small flock numbers in households poultry production system [5].

Poultry production in Ethiopia is characterized by low input and output husbandry system that influence production and productivity of chicken, lack of awareness about important feeds, feeding practice, disease, poor management, predation, lake of organized market, cost feed and predators remains to be the major challenges in chicken production [6].The ability of poultry to adapt to most in Ethiopian, their rapid growth rate, fast reproduction rate compared to most other livestock or the rapid generation time, a simple means of generating family income and employment opportunities raised with relatively low capital investment and readily available household labor compared to other domestic animals all make poultry an ideal starting point for beginning production and for family use as a rich source of animal food for human being [7]. The primary objective in feeding poultry is to secure the most economical gains in weight during growth and fatting and the most economical production of eggs throughout the laying period [8].

The feed resources for rural chicken production in Ethiopia is scavenged and consists of household waste, anything edible found in the immediate environment and small amounts of grain supplements provided by the woman [9]. Village chicken production fits quite well with the conditions of rural households due to small feed cost, space requirement and low price of the animals [10]. In Ethiopia the chicken production is characterized by keeping under free range system with some amount of supplementary feeds like Furshika, maize, sorghum, food leftover and the major feed sources are believed to be insect worms, seed and plant materials [11]. However, the availability of the supplementary feeds is reported during the dry season (November to March) following the grain harvest while the grains/grain by-products were in short supply leading to feed scarcity during the rainy reason [12].

The most dominant (75%) chicken production system in Amhara region is free range /scavenging type/ using a majority (95.8%) of local chicken ecotypes, with only seasonal feed supplementation, scavenging only (2.5%), scavenging with regular feed supplementation (21.9%) and intensive production system (0.63%) [13]. The major proportion of chicken production (98%) in Amhara National Regional State (ANRS) is a traditional sector, at small holder level, from which almost the whole annual meat and egg production is, produced [14]. There for this study weremainly design to assess feeding practices and health management of backyard chicken in farta district, Amhara region.

1.2 Statement of the Problem

Although there is a huge potential of keeping poultry production system in the area, it is traditional in the system of production. Poultry production in Fogera district is characterized by low feed resource supplements and feeding practice system and it leads to lower the product and productivity of chicken. Basically, backyard chicken feeding and health management systems are less in this area due to lake of awareness and lake of feeding system. So the main important and function of these study was to assess feeding practice and health management in Fogera district and give more appropriate solutions for the owner and other individual involving in backyard production system.

1.3. Objectives

1.3.1 General objectives

- The general objective of this study was to assess on backyard chicken feeding practices and health management in Fogera district

1.3.2 Specific objectives

- To assess backyard chicken feeding practices in Fogera district
- To assess backyard chicken health management in Fogera district

1.3.3 Research Question

1. What the farmers in Fogera district feed their chickens and what they feed?
2. What the farmers in Fogera district manage the health of their chicken?

2. Material and Methods

2.1 Description of the study area

This research was conducted in Fogera district, South Gonder Zone, Amhara Region State of North West Ethiopia. Fogera district is bordered in South by Dera district, in the North by Libo in the East by Farta district and in West by Tana Lake district. Woreta Town is surrounded by Fogeradistrict, It is situated at $11^{0}58'$ latitude and 37^{0} 41' longitude. Woreta is the capital of the woreda and is found 625 km North way of Addis Ababa and 55 km from the regional capital, Bahir Dar, on the way leading to Gonder town and 42 km south west of Debretabor, Zonal Capital. The Woreda is divided in to 33 rural peasant associations/ Kebeles. According to the Woreda Agricultural Office, the total land area of the woreda is 117414 hectares, cultivated land 60200 ha, grazing land 22122 ha, forest land 2190 ha, wet land 1698 ha, water body 22259 ha, settlement 7075ha and others are 1870 ha. The total human population of the Woreda is 228449; out of this 116465(51%) are male and 111984(49%) females. According to Fogera woreda, Agricultural office, there are 266,498 Cattle,41,466 Sheep, 31,704Goat, 32,687Equine,131,341 Chicken and12600 Bee hive; out of this 663 are Modern hive,82 Transitional and 16,855Taditional hives are found [15].

2.2 Source of data

Primary and secondary source of data was collected from selected kebeles. The primary source of data were collected through questionnaire, interview and observation, whereas, secondary source of data were collected from published and unpublished documents. And also the sources of secondary data were from previous finding and record data from agricultural office of Fogera district.

2.3 Sampling Techniques and Sampling Size

There are 33Kebele in Fogera district, among those two kebele were selected purposively by considering the distance, transport, time saving and availability of chickens of the study area. Sample size determines by, finally the two Kebele namely Quar Abo and Quar Michel was taken by random sampling and 15 households from each kebele, totally 30 households were included in the study.

2.4 Data collection method

Semi-structured questionnaires' were prepared to take relevant data from the households through English in both open-ended and close-ended questionnaires and translated to local language Amharic when interviewed the households. Data from house hold survey (most recent and easy to recall) where used to estimate feeding practice, health managements and mortality rate of backyard chicken flock for a period of time gathering data at April 2018.

2.4.1 Focus group discussion

In the study we make a group discussion with backyard chicken feeding practices and health management system of chicken and their farmers on the management and constraint of chicken production performance.

2.5 Method of data analysis

Data collected through questionnaire to obtain full information and finally organized, summarized and analysis by using Microsoft excel and descriptive statistics like, average, mean, percentage was included in tabular form.

3. Expected out put

The expected output was providing organize and summarized information about production of backyard

chickens, feeding practices and its health management. The need of this study to create awareness about feeding practice and health management for the respondents have general knows about sustainable chicken production.

4. Result and Discussion

4.1 General Information in the Study Area

4.1.1 Demographic Characteristics of the households in the study area

The status of the interviewed respondents was shown in Table 1. About 53.33% male and 46.67% of the respondents are female in both Kebeles. Although the age groups of the 40% were at young age from 20-42 in both Kebele are 43.33% and 42-62 age respondent has 40%, whereas greater than 62 age of respondents has 16.67%. In additions to this the educational status of 50%, 13.4% and 20% of illiterate, reading or writing and elementary in respectively and also in the study areas10% and 6.7% of the respondents are learn in high school and college (university).

Table 1: Charactrsices of the interviewed respondent sex, age group and Educational status in the study area

Demographic character		Kebele		
		Quar Abo	Quar Michel	Total
		N (%)	N (%)	N (%)
Sex	Male	7(46.67)	9(60)	53.33
	Female	8(53.33)	6(40)	46.67
Age group	20-42	7(46.67)	9(60)	53.33
	42-62	8(53.33)	6(40)	46.67
	>62	5(33.33)	-	16.67
Educational Level	Illiterates	8(53.33)	7(46.67)	50
	Read &write	2(13.33)	2(13.33)	13.33
	Elementary	2(13.33)	3(26.67)	20
	High school	1(6.67)	2(13.33)	10
	Collge &university	(13.33)	-	6.67

As shown in Table 2, 4.74± 2.17 respondents were male, whereas 5.55±2.19 were female in the two Kebele of family size. In the study area the total chicken populations are 244 in the two Kebele. Furthermore, the dominant flock structure were layers (6.73±2.89), pullets (3.96±2.31), cocks (2.46±1.70), cockerels (1.25±0.53) and chicken (3.33±1.98) In agreement with this study, Samson; Endalew (2010) reported that 96%of the village chicken producers keep all ages of chicken together. The relatively higher proportion of laying hens per household in the study area might be because of the interest of the farmers for increased egg production and using laying hens as parent stocks for hatching as the sources of replacement. The mean flock size in the study was 17.7 which was greater than report of [16] in Hwassa zuria (8) and by [11] for Dale woreda (9.2) and the report of [17] which was (6.2) of national average. The number of chicken and cockerels were few which might indicate that all farmers don't have interest to rear cockerels as they require only layer poultry population for selling egg. And also the population of chickens are less as compared other poultry production due to different predators like bird [11].

Table 2: Family size and flock size of chicken in the study area

Parameter		Kebele		
		Quar Abo	Quar Michel	Total
		Mean & SD	Mean &SD	Total
Flock Size	Cocks	1.53±1.37	0.93±0.33	2.46±1.70
	Layer	3.47± 1.45	2.56±1.44	6.73±2.89
	Cockerels	0.73±0.40	0.52±0.13	1.25±0.53
	Pullet	2.93±1.30	1.03±1.01	3.93±2.31
	Chickens	1.93±0.78	1.73±1.21	3.33±1.98
	Total flock size	10.59±5.3	6.77±3.12	17.7±9.41
Family Size	Male	1.87±0.16	2.87±1.01	4.74±2.17
	Female	2.75±1.25	2.8±0.94	5.55±2.19

As the interviewed respondents below Table 3, most of framers get their chicken from market/purchasing/ (76.66%) and from research center (10%), whereas hatching from naturally at home (10%) and as gift (3.33%) in the two Kebeles. The important of keeping chicken production in the study areas used for income generation (selling) household consumption and both. Majority of the (46.66%) use chicken for both sell and consumption, whereas significant number of them keeps for income generation (40%) and 13.33% used for only consumption. This result the current study disagree with the reports of [18] and [13] indicate that village chicken is raised in Northwest Ethiopia for various purposes and the first purpose (51%) of production of village chicken is sale for cash income. Therefore rural poultry is an important element in diversifying agricultural production and increasing household food security. This indicates that poultry production in study areas used as important source of sell and consumption and come mainly for female headed households. In line with this [2] reported that farmers attach greater.

Table 3: Sources of chicken and importance of chicken in the study area

Kebele				
Parameter		**Quar Abo (N=15)**	**Quar Michel (N=15)**	**Total (N=30)**
		N (%)	**N (%)**	**N (%)**
Sources of chicken	Market	13(56.52)	10(66.67)	76.67
	Research center	-	3(20)	10
	As gift	1(6.67)	-	3.33
	Hatching home	1(6.67)	2(13.33)	10
Purpose of chicken	Consumption	3(20)	1(6.67)	13.33
	Sell	4(26.67)	8(53.33)	40
	Both	8(53.33)	6(40)	46.6

4.1.2 Feeding system of backyard chicken in the study area

The major feeds and feeding practices of chicken in the study area as indicated by the respondents are summarized in Table4. There is no purposeful feeding of rural household chicken in Ethiopia and the scavenging with supplementary feed resource is almost the only source of feed. Since in the study area all respondents provide wheat and maize and also used in some times sorghum in 63.33%, 23.33% and 20 respectively as additional supplements feed in both Kebele. Some respondents said that cereal grains like (maize and Rice) purchased from market. This result is line with [19] in Hawassa his study who reported severe scarcity of scavenging feed source during wet seasons indicating that availability of scavenging feed source basis depends on seasons and backyard conditions. Since the major source of chickens feed are scavenging, scavenging with supplementary, 13.33% and23.33% in respectively, where as 26.67% and 40% are purchase from the market and use at home. Information from the respondents, only supplementary feed is given to young chicks could not fulfill their nutritional requirement since supported by scavenging as compared to mature chickens. In contrast to this result [17] reported that supplementary feed materials are offered to all classes of chicken on bare ground.

Table 4: Sources of chicken feed and supplementary feed in the study area

Kebele				
Parameter		**Quar A**	**QuarMichel**	**Total**
		N (%)	**N (%)**	**N (%)**
Sources of feed	**Scavenging**	-	4(26.67)	13.33
	Scavenging with supplementary	1(6.67)	6(40)	23.33
	Purchased	5(33.33)	2(13.33)	26.67
	Home	9(60)	3(20)	40
Supplementary feed	No	3(20)	1(6.67)	13.33
	Yes	12(80)	14(93.33)	86.67
Type of supplementary	Maize	4(26.67)	2(13.33)	20
	Wheat	8(53.33)	11(73.33)	60
	Sorghum	4(26.667)	2(13.33)	20
	Barely	-	-	-

The proportion of the frequency feed in both kebele show that below Table 5, then 36.67%, were feeding their chicken twice per day, 0.67% once per day and the rest 56.67% was three ways per day. Generally the way of feeding for chicken is individual and group feeding. Most chicken produced used group feeding system without classification of their age, purpose and chicken type we observed in the study area. This result is line with [20] who reported severe scarcity of scavenging feed source during wet season indicating that availability of scavenging feed source basic depend on season and backyard conditions. The respondents in farta district provide supplementary feed at frequently three times per day at mooring and evening, morning and after noun, morning, after noun and evening in the 33.33%,6.67% and 53.33%, where as 6.67% provide feed at morning only. This results is in agreement with [21] reported frequency of feeding, 81.1% and 76.7% of the respondents in Lume districts, feed their chicken three times per day respectively, while 18.9% and 23.3% provide two times per day in the same order.

Table 1: Frequency of feed, feeding time and methods of feeding of chicken in the study area

Kebele				
Feeding system		**QuarAb**	**Quar M**	**Total**
		N (%)	**N (%)**	**N (%)**
Feeding time	1 Time per day	1(6.67)	1(6.67)	0.67
	3 Time per day	9(60)	8(53.33)	56.67
	2 Time per day	5(33.33)	6(40)	36.67
Frequency of feed	Morning & evening	3(20)	7(46.67)	33.33
	Morning &after none	2(13.33)	-	6.67
	Morning, after none & evening	9(60)	7(46.67)	53.33
	Morning only	1(6.67)	1 (6.67)	6.67
Way of feeding	Totally in group	10(66.67)	9(60)	63.33
	Separating in age	5(33.33)	6(40)	36.67
Place of feeding	On trough	3(20)	3(20)	20
	On ground	12(80)	12(80)	80

As show below Table 6 from the total of 30 respondents most of the time chickens need extra feed in wet season and other feed shortage can be occurred therefore, 90% of extra feed occurred in wet season. Where as 10% of extra feed can be occurred in dry season so the major respondents say that the poultry can be need additional feed in wet season [22]. In addition to this, the feed shortage season of chicken then the lack of chickens feed occurred in rain season. Since feeding shortage are occurred in rainy season 96.67% and 3.33% of feeding shortage season occurred in dry season in both Kebele.

Table 6: Extra feed season and feed shortage season of the chicken in the study area

Kebele				
Activates		**Qua Abo**	**Quar M**	**Total**
		N (%)	**N (%)**	**N (%)**
Extra feed season	Wet season	12(80)	15(100)	90
	Dry season	3(20)	-	10
Feed shortage	Rainy	14(93.33)	15(100)	96.6
	Dry season	1(6.67)	-	3.33

4.1.3 Backyard chicken health management in the study area

The survey shows that the majority of infections was their own flock and unknown (46.67%) and 26.67% respectively, whereas 26.67% and 3.33% of sources of infection were neighboring house hold and incoming chicken in quara abo and quara michel Kebele. The respondents said that the major sign of poultry disease are; cough, feather problem, not moving freely, not eat feed, black eye are the major and dominant signs in the study area(Table 7).On the top of the above finding our results the same with [18] reported that the major cause of death in local chicken in North West Amhara is seasonal outbreak of diseases, which is Newcastle disease (NCD) is the most prevalent and economical important disease that devastates village chicken production. In addition to this all of the respondents said that treat the chicken disease by using modern mechanism (96.67%), where as some of respondents use traditional system (3.33%). There for the major respondents are not used traditional treatment about 83.33% in some cause 16.67% respondents used traditional treatment like bleeding the leg of chicken and provide enjera mix with pimento (karya).

Table 7: Source of infection and treatment of chicken disease in the study area

Kebele				
Health management		**Abaregay**	**Kanat**	**Total**
		N (%)	**N (%)**	**N (%)**
Access of veterinary	Yes	15(100)	1(6.67)	53.33
Service	No	-	14(93.33)	46.67
Practices of Annual	Yes	13(86.67)	9(60)	73.33
Vaccination	No	2(13.33)	6(40)	26.67
Lose of chicken	Rain	10(66.67)	10(66.67)	66.67
	Dry	-	-	
	Both	5(33.33)	5(33.33)	33.33
Occurrence of chicken	Yes	13(86.67)	7(46.67)	66.67
Disease in the study area	No	2(13.33)	8(53.33)	33.33

From the total of 30 households (73.33%) respondents use annual vaccination against Newcastle (fengil), but 26. 67% of respondents cannot used annual vaccination. More over the chicken population lose in rain season (66.67%), dry season 0% and in both (33.33%) so this indicates chickens mostly affected in rain season (Table 8). From the total 66.67% of the respondent understanding known disease in the area by consider different clinical sign, where as 33.33% respondents cannot identify the disease of chicken in the study area.

Table 8: Access of veterinary services and lose of chicken season in the study area

Kebele				
Health management		**QuarAb**	**Quar M**	**Total**
		N (%)	**N (%)**	**N (%)**
Experience of respondent about any disease	Yes	14(93.33)	14(93.33)	93.33
	No	1(6.67)	1(6.67)	6.67
Source of infection	On flock	7(46.67)	13(86.67)	66.67
	Incoming	-	1(6.67	3.33
	Neighboring	4(26.67)	3(20)	23.33
	Unknown	4(26.67)	6(40)	33.33
Treatment of disease	Modern	15(100)	14(93.33)	96.67
	Traditional	-	1(6.67)	3.33
Traditional treatment	Yes	16.67	2(13.33)	3(20)
	No	13(86.67)	12(80)	83.33

5. Conclusion and Recommendation

5.1 Conclusion

The objective of the study was to examine the backyard chicken feeding practices and health managements in Fogera districts. Respondents in the study area revealed that major activities in poultry production were performed by women. As a result women have higher ownership rights and more responsibilities in the production process than men in the studied area. Most of the respondents in the studied area provide a supplementary feed from grain, like maize and Rice as additional supplements. So providing the feed many of the owners feed simply on the ground which leads to wastage of feed, feed contamination and it also increases feed competition among the flock where only the strong ones are going to eat, whereas some respondents provide feeds on the Federer (trough), regarding to feeding practices the major respondents provide feed in group. we observed that the dominant flock structure were layers, pullets, cocks and cockerels. From those flock the higher proportion was laying hens. The common diseases of backyard chicken production system in the study area are Newcastle, as we observe the study area most respondents use modern vaccination, this indicated that the farmers awareness were changed know a days. then the major respondents are control this Newcastle disease before happen, but in some cause the respondents can be used traditional system, so all chicken producers better to use vaccination before affected of the chicken by different disease. Governments should be strengthening the local private /public drugs/ vaccine supplier and services providers.

5.2 Recommendation

Based on the above conclusion the following recommendations are forwarded.

- In the studied area most labor was covered by women farmers, and then there should be provision of regular trainings on chicken husbandry practices to women is essential
- Technical support or training to chicken owners must be needed to improve productivity of local chicken. Then there should be accredit service for providing day old chicks and facility of electricity must be supplied to use modern technologies.
- Almost all household are used on ground (floor) feeding practices for the chicken, since the respondents better to use on feed trough (Federer).
- In the study area some respondents are used traditional systems of chicken disease treatment, since better to use modern mechanism.
- Government should train farmers and extension staffs focusing on diseases control, improved housing and feeding, proper data recording system should be arranged to be successful in poultry production system.

6. References

1. Eugene F. A longitudinal analysis of chicken production systems of smallholder farmers in Leyte, Philippines. Leyte state university, leyte, The Philippines; c2004.
2. Aklilu H. Village Poultry consumption and marketing in relation to gender, Religious festivals and market access. Tropical Animal Health and production. 2007;39:165-168.
3. Abera M, Solomon D. Study on characterization of local chickens in southern Ethiopia proceeding held in Hawassa; c2007.
4. Central Statistical Authority /CSA/. Agricultural sample survey statistical Bulletin No.331.Addis Ababa, Ethiopia; c2014, 2.
5. Demeke S. Suitability of hay-box brooding technology to rural households' poultry production system. livestock Res; c2007, 19.
6. Permin A. Problem related to poultry production at village level. Production system, Jimma University College of Veterinary Medicine, Jimma, Ethiopia; c2000.
7. Solomon D. Suitability hay box brooding technology to rural household poultry; c2007.
8. Nugussie D. Production objectives and Trait preferences of village poultry producers of implications Ethiopia: for designing breeding schemes utilizing indigenous chicken genetic and the well-being of the human population through resources. Trop. Anim. Health Prod. 2010;42:1519-529.
9. Alemu Y. Village chicken production systems in Ethiopia: Use patterns &performance valuation and chicken products & socioeconomic functions of chicken. Livestock Research for Rural Development. 2003;15(1).
10. Dessie T. Village chicken production in the central and western highlands of Ethiopia: Characteristics and strategies for improvement: International Livestock Research Institute Development; c2013.
11. Mekonnen G. Characterization of the Small Holder Poultry Production and Marketing System of Dale, Wonsho and LokaabayaWeredas of SNNPRS. M.Sc. Thesis, Hawasa College of Agriculture, School Of Graduate Studies, Hawassa University, Hawassa, Ethiopia; c2007.
12. Alemayehue A. Village Chicken Production Systems in Selected Areas of Benishangul-Gumuz, Western Ethiopia. Asian J Poult. Sci. 2015;9(3):123-132.
13. Fisseha M, Abera M, Tadelle D. Assessment of village chicken production system and evaluation of the productive and reproductive performance of local chicken ecotype in Bure district, North West Ethiopia. African Journal of Agricultural Research. 4 July 2010;5(13):1739-1748.
14. Amhara National Regional State Bureau of Agriculture and Rural Development /ANRS BoARD/. Poultry Development and Marketing Strategy.Bahir Dar, Ethiopia; c2006.
15. Mengesha M. Climate change and the preference of rearing poultry for demand of protein foods. Asian J Poultry Sci. 2011;5(4):135-143.
16. Asefa T. Poultry management practices and on farm performance evaluation of Rhohde Izland Red,Fayomy and local chicken in umbulowachu water shade in Sidama Zone, MSc thesis, Hawassa University, Hawassa, Ethiopia; c2007, 126.

17. Meseret M. Characterization of village chicken production and marketing system; c2010, 110.
18. Halima H. Phenotypic and Genetic Characterization of Indigenous Chicken Populations in Northwest Ethiopia. PhD Thesis; University of the Free State. Res. J of Agri. Sci. 2007;2(1):110-113.
19. Doviet M. Effect of supplementation, breed, season, and location on feed intake and performance of scavenging chickens in Vietnam. Ph.D., thesis, Swedish University of Agricultural Sciences; c2005, 45.
20. Leulseged Y. Study on production systems of indigenous and improved poultry in rural area of North Wollo, M.SC. thesis), Alemaya, Ethiopia; c1998.
21. Desalew T. Management practices, productive performances and egg quality traits of exotic chicken under village production system in East Shoa, Ethiopia. MSc.thesis .Hawassa University, Graduate Studies of Addis Ababa University, Debre Zeit, Ethiopia; c2012.
22. Benvenuti M. Buckwheat bran (Fagopyrumesculentum) as partial replacement of corn and soybean meal in the laying hen diet.Ital J Anim. Sci., 11:2. Bloemfontein, South Africa; c2012, 186.