

Full Length Research Paper

Urban poultry production systems and constraints of local and exotic chickens reared in Yirgalem and Hawassa Towns, Ethiopia

Yonas Kejela^{1*}, Sandip Banerjee², Mestawet Taye² and Mohammed Beyan²

¹Department of Animal Science, College of Agriculture, Jinka University, P. O. Box 165, Jinka, Ethiopia.

²Department of Animal and Range Sciences, College of Agriculture, Hawassa University, P. O. Box 222, Hawassa, Ethiopia.

Received 16 October, 2018; Accepted 26 November, 2018

Rearing of chicken plays important roles on both the rural and urban economy of Ethiopia. This study was conducted to assess urban poultry production system and productive performance of local and exotic chickens reared at Yirgalem and Hawassa towns of Southern Ethiopia. Stepwise purposive sampling method followed by random sampling was used to select the respondents. In total, 180 respondents were selected based on their experience in chicken production. The results of the study indicated that most of the respondents reared the chickens using backyard production system. Most of the respondents (77.8%) reared chicken using both free range and semi intensive management system. All the respondents provided supplementary feed, while majority of them provide water to their flock. The findings also showed only 38.3% of the respondents provided separate houses for their flock. The Major constraints in the study areas which affected the flock were diseases (Newcastle and coccidiosis), followed by adaptability especially for exotic chickens. It was concluded that the management system of chickens in the study areas were well, compared to rural management system; nonetheless it needs further work on their better health care, scientific nutrition and management. It was also observed that the contributions of the exotic chickens to the livelihood and food security of the rearers are significant.

Key words: Constraint, exotic and local chickens, Southern Ethiopia, Urban poultry production.

INTRODUCTION

In spite of global and regional economic growth, food insecurity remains a pressing problem in many parts of the world and this is true especially in Africa. It is reported that the urbanization in Africa are currently lower than the other regions of the world and is expected to result in an increase in the urban population from 40 to 56% by 2050 (Hussein et al., 2016). The UN-HABITAT (2006) reports

indicated that the percentage of urban residents in Sub-Saharan Africa (SSA) is expected to increase from 30 to 47% of the total population, between the year 2005 and 2030.

This will be coupled with several critical challenges associated with the development of urban policies, especially in terms of ensuring household food security.

*Corresponding author. E-mail: ykejela@gmail.com.

Finding of a study by Beall and Fox (2007) indicates that that as the world's urban population grows, so will be the population of the urban poor. The overall cost of supplying, distributing and accessing the availability of food is likely to increase as the number of urban households escalate (Tschirley et al., 2015). The condition of the resource challenged (urban) is quite disturbing as almost all of them derive their nutritional requirements from the market (Thomas, 2013). Thus, it becomes imperative to strengthen the urban agriculture, which to a certain extent can provide a realistic solution to overcome the critical food insecurity as is being observed in many parts of the developing world (Van Veenhuizen, 2006).

In all these aspects, rearing of chickens can create additional income besides consumption of eggs can help improve nutritional security to the most vulnerable sections of the urban resource challenged specifically, pregnant and nursing mothers, old and infirm people, growing children and those who are suffering from immune compromising diseases (Ruxton, 2013). It has widely been reported that chickens are the most widely kept livestock species in the world (Moreki et al., 2010). In the developing countries, indigenous chickens are widely distributed in almost all the rural and peri-urban areas where they play the important role of income generation and food production (Moreki et al., 2010).

In Ethiopia, the evolution of the poultry sector (in recent times) has highlighted the growing importance of small and medium-scale producers residing in the urban and peri-urban areas (FAO, 2008). Even if the indigenous chickens are better to adapt the harsh environment, they are tolerant to many diseases and are good brooders, but they are poor in their reproductive performance. Therefore, in order to improve the performance of the local chicken the exotic chicken were imported such as White and brown Leghorns, Rhode Island Red, New Hampshire, Cornish, Australorp Light Sussex and others were then crossed with local chicken (Nigussie, 2011). Since then, the higher learning institutions, research organizations, the Ministry of Agriculture and certain Non-Governmental Organizations (NGO's) have disseminated many exotic breeds of chicken to rural farmers and urban-based small-scale poultry producers (FAO, 2008). Reports from Dirsha (2009), Tadesse et al. (2013), Akililu et al. (2013), Haftu (2016) and Aman et al. (2017) indicate that the exotic chicken such as Brown, Bovans Brown, Potchefstroom Koekoek and Sasso were distributed to smallholder farmers of some part of Ethiopia.

The importance of urban poultry production cannot be ruled out; however, there have been comparatively fewer studies on urban poultry production. The constraints for different ecotypes of the chickens raised in the urban surroundings too have rarely been studied. Therefore, based on the above background, the study was conducted to study the production system and constraints

of local and exotic chickens in Hawassa and Yirgalem towns.

MATERIALS AND METHODS

Description of the study area

The study was conducted in Hawassa city (7°03' latitude North and 38°28' longitude East at the elevation of the 1708 m a.s.l) and Yirgalem town (latitude and longitude of 6°45'N 38°25'E and an elevation of 1776 meters). Both locations are situated in the Sidama zone of the SNNPRs region of southern Ethiopia (IPMS, 2005). According to the report of FAO (2007), zone of Sidama, Hadiya and Gurage together accounts for about 43.6% and the urban area constitute 2.1% of the total regional indigenous chicken population of SNNPR.

Sampling techniques and sample size

Stepwise purposive sampling process was followed by random sampling procedure was used. From the eight sub-cities of Hawassa, three sub-cities were selected purposively based on the chicken populations of the area and as suggested by the authorities of the Bureau of Agriculture. The sub-kebeles within the sub-cities, two kebele too were purposively selected based on the chicken population. Furthermore, the respondents were selected based on their experience in chicken production and willingness to participate in the survey. From the identified individuals 20% (180 respondents) of them were randomly selected for the survey work (Kish, 1965). While from Yirgalem town, which has nine kebeles, the four kebeles were selected purposively based on the above-mentioned criteria. Among the selected kebeles, it was also purposively identified that the people who have local and exotic breed species have five or more chickens.

Data collection procedure

The study encompassed semi-structured questioners. The questioner was pretested and then administered to traditional poultry rearers and selected poultry owners to gather information on poultry production systems, constraints and opportunities related to the poultry production.

Statistical analysis

The qualitative and quantitative data collected from survey of urban poultry production systems were analyzed using SPSS version 16 (SPSS, 2007). The means of the quantitative traits were compared using Duncan Multiple Range Test (Duncan, 1995); while two-way ANOVA was used to compare the values across the two studied locations. As regards the qualitative traits, the values were compared using Chi-square test. The values were considered significant at 5% levels. A priority index was also used to rank the constraints of urban poultry production according to their severity and opportunities based on their relative importance using the following formula:

$$\text{Priority index} = (F1*4) + (F2*3) + (F3*2) + (F4*1)/F_{\text{total}}$$

F1= Frequency of the first rank;

F2= Frequency of second rank;

F3 = Frequency of third rank;

F4= Frequency of fourth rank;

FT= Frequency of total respondents.

Table 1. Experience, breed type and sources of chicken in the study areas.

Variable	No. of respondents	Percent	($\chi^2 < 0.05$)
Average years you have reared chicken (Mean \pm SD.)	180	8.23 \pm 2.24	
Breed types of chickens (%)			
Local	50	27.8	
Sasso	61	33.9	
Bovans Brown	29	16.1	
Local and Bovans Brown	7	3.9	
Local and Sasso	28	15.6	
Sasso and Bovans Brown	2	1.1	
Sasso and Koekoek	3	1.7	
Source of the exotic chicken (%) (N=130)			
Government extension	105	58.3	0.005
Market	69	38.3	
Relative	6	3.3	
Age of the exotic chicken while start rear (%) (N=180)			
Starter (0-8wks)	96	53.3	0.003
Layer/hen	34	18.9	
Have no exotic chicken	50	27.8	

RESULTS AND DISCUSSION

Experience, chicken type, and its source of chicken in the study areas

The results from Table 1 indicate that most of the respondents in the study area are well experienced in rearing chicken. The findings further indicate that the three popular ecotypes of chickens namely Sasso, Bovans Brown and Koekoek these are besides the local ecotypes. The results also are indicative of the fact that the respondents received the exotic ecotypes from the governmental agencies followed by procuring the same from the nearby markets. This result indicate that most of the respondents rear the young cockerels/pullets while a few have procured the adult hens.

The results of the experience of rearing the chickens (Table 1) in the study areas are similar with reports of Melese and Melkamu (2014) and Nebiyu (2016). Alemayehu (2017) has report that having experience of livestock rearing plays an important role in improving the husbandry practices as the rearers are better aware of the disease symptoms, feeding and watering needs besides egg storage and incubation management. A highly significance difference ($P < 0.05$) was observed on the sources and time (age) of the exotic chicken of the respondents to start rearing. This result similar with the findings of Aman et al. (2017) who reported that most of the village chicken owners in Wolaita zone and Kambata Tambaro zone were procured pullets from private farms

and local cooperatives, while some received them from government authorities. Procurement of pullets over day old chicks ensures less chances of mortality from either diseases or parasites (Abraham and Yayneshet, 2010). The pullets, if procured from non-government organizations or from Bureau of Agriculture, can ensure that they have been vaccinated against the important diseases prevailing in the areas thereby resulting in better growth and lower mortality (Hawassa BoLF, 2016; Yirgalem BoLF, 2016).

Chicken production system in study areas

The results pertaining to the husbandry practices of the chickens reared in the study areas are presented in Table 2. The results from the table indicate that most of the respondents reared the chickens under traditional/scavenging conditions without proper housing and management. This finding is in consonance with the observations of Mekonnen (2007). Backyard poultry rearing system has certain advantages and disadvantages, while the former is because the cost of feeding is significantly reduced, for they feed home grain and feeds from leftovers (FAO, 2007). The disadvantages being that the chickens are exposed to many diseases and parasites besides they may not be able to obtain balanced nutrition (Alemayehu, 2017). In the backyard chicken production system, the feed availability may not be sustainable all year around (Ravindran, 2013). Hence,

Table 2. Production and management system, and feed source of chicken in the study areas (N=180).

Variable	Location			$(\chi^2 < 0.05)$
	Hw	Yr	Total	
Production system (%)				1.000
Traditional/backyard	97.8	97.8	97.8	
Small-scale commercial	2.2	2.2	2.2	
Management practice (%)				0.150
Free range (scavenging)	16.7	26.7	21.7	
Indoor rearing (intensive)	0	1.1	0.6	
Scavenging and indoor	83.3	72.2	77.8	
Source of feed (%)				0.000
Commercial feed	16.7	2.2	9.4	
Scavenging and supplementary feeds	24.4	3.3	13.9	
Scavenging and home by-product	14.4	26.7	20.6	
Home by-product, scavenging and supplementary feeds	44.4	67.8	56.1	

Hw = Hawassa, Yr = Yirgalem.

the respondents need to be made aware of scientific poultry husbandry practices including housing and feeding, presently the proportion being quite low. The respondents need to be appraised about the importance of modern poultry husbandry practices, which can enhance the productivity of the hens and the profitability of the venture (Moges et al., 2010).

Management practice of the chicken in the study areas

This result shows that most of the respondents (77.8%) allowed their chickens to scavenge during the daytime but housed them indoors after dusk. This may be to prevent the chickens from the vagaries of nature and predatory attacks. The rest of the respondents indicated that they either reared the chickens under free or solely in confinement. The result is in accordance with finding of Srinath (2009), who reported that the chickens in the study area are reared in a semi intensive manner where the chickens are kept in the fenced area and housed at the night. Although Ravindran (2013) reported that the feed is not available in the year around in scavenging management system; the study by Zelnter and Maurer (2009) indicates that the laying hen in a scavenging system may show beneficial behavioral elements, which are not possible in the poultry house. However, the values obtained from present findings are higher than form the observation of Aman et al. (2017) from Wolaita zone and Kambata Tambaro zone. Emebet (2015) also indicated that a few number (28.45%) of the farmers manage their chickens semi-extensively in South-West

Showa and Gurage of Ethiopia.

Feeds and feeding system of chicken in the study areas

This result indicates that most of the respondents provide the chickens with food leftovers and feed supplements. The feedstuffs included home by-products or food leftovers (*injera*, bread, *kocho* and vegetables), scavenging and supplementary feeds such as maize, wheat, wheat bran (*Frushika*) and *kinche* (broken grains). However, some of the respondents (20.6%) also indicated that they provide only the food leftovers and rely on scavenging; While, for some of the respondents the only way by which their chickens sustain is by scavenging for feed. A highly significance difference ($P < 0.05$) was observed on the feed sources of chicken in the study areas.

This findings indicate that besides food left and scavenging the respondents provide some supplementary feed, which is indicative of better feeding management. Provision of supplementary feed can ensure better productivity and the reproduction potential of the birds (Gezahegn et al., 2016). The supplementary feeds provided to the chickens in the study areas are similar observations of recorded by Wondu et al. (2013) from Northern Gondar of Ethiopia. The provision of supplementary feed can be correlated with better awareness and knowing the importance of the supplementary feeds among the respondents (Alemayehu, 2017). The results however show that supplementary feeds offered for the chicken in the study

areas were those with high-energy content with low protein (Alemayehu, 2017). Imbalance between energy and protein form of feed is not desirable as it impairs with the utilization of either of them, high energy in feed will decrease feed intake, which lead to decrease egg production performance and quality (Nebiyu, 2016).

Watering system of the chicken in the study areas

This finding also indicate that 95.6% of the respondents provide water for their chickens'. This is an indicator of good husbandry practice, besides that they provide water adlib (86.1%) too indicates their concern about providing water to their flocks. While some of the respondents too indicated that they were not careful to provide water to their flocks, the numbers were too few and hence they need to be made aware of the importance of water as an important nutrient. This results related to provision of water among the chickens are in accordance with the observations of Desalew (2012) from East Shewa of Ethiopia.

Water is one of the most important but neglected of all the nutrients; both quality and quantity of water available to the chickens need to be optimum for overall improvement in productivity (Ravindran, 2013). The present findings (of provision of water adlib) are in accordance with the observations of Dirsha (2009) and Desalew (2012). However, the finding by Meseret (2010) also reported that water is provided at certain times of a day. This can have both beneficial and adverse effects, while the former is linked with the cleanliness and the later is linked with the welfare issues (Van Horne and Achterbosch, 2008).

Housing system of the chicken in the study areas

This finding shows the housing management prevalent among the poultry rearers in the study areas. The study indicates that the common method of keeping the chicken was to rear them in the kitchen (45.6%); some of the respondents (38.3%) constructing separate houses for the chickens followed this. This finding also shows that many of the respondents house their chickens in their kitchen, the value of observation being higher than those of Addisu et al. (2013) who reported only 20.92% of the chicken perched inside kitchen in North Wollo in Amhara region. Housing chickens in the dwellings of their owners can have consequences such as transmitting diseases and parasites among their owners (Bailey and Larson, 2013). Hence, the owners need to be appraised of the consequences of such housing. The results also show that many of the respondents (38.3%) provide separate dwellings for their flock, which is a good husbandry practice, provided the house is properly maintained and cleaned periodically and the study is similar with the

finding of Ayalew and Adane (2013).

Health management of chicken in the study areas

This result shows that the discussion with the town veterinary health care experts indicate that there was the problem of health of the chicken in the study area and most prevalent disease is the Newcastle. The second important disease in the study areas were coccidiosis especially during high rainy season followed by Ecto-parasite. Due to these reasons, most of the respondents in the areas (56.1%) were practice culling or 43.6% takes culling as preventative major for their chicken. The difference ($P < 0.05$) were observed in the study areas on the reason for culling chicken. Most of the respondents indicated culling of birds suffering from diseases, which these observations concur with the findings of Desalew (2012). This is one of recovering loss at times of disease outbreaks but can have adverse consequences as it assists in spread of diseases to locations, which are free from diseases. Getu and Birhanu (2014) reported that incoming chicken causes the disease rather than own flock in the study areas in Northern Gonder, Amhara region. Thus, the authorities should ensure that under such circumstances the movement of the birds (through traders or otherwise) is arrested. In case, the dead birds should be properly disposed, and that the carnivores and other animals/birds (Bailey and Larson, 2013) do not devour their carcasses.

The respondents of the study areas use both the modern veterinary medicines and ethno veterinary medicines. The ethno veterinary medicines was used for their chickens were by drenching or giving with feed the commonly used floral medicines, such as feto (*Brassica* spp), lemon (*Citrus*), red pepper (*Capsium* spp) and nech shinkurit (*Allium sativum*). The floral medicines as reported by the respondents were similar to those observed by Wondu et al. (2013) from urban areas of Northern Gonder. The similar authors also reported that the respondents from the area were also used Areke (local beverage) and Grawa (*Vernonea amygdalon*). Feleke et al. (2015) also reported the popularity of ethno veterinary medicaments from rural areas of Sidama province. The availability of traditional medicines may be ascribed to beliefs of the respondents towards such medicaments (Roberts, 1971).

Opportunities and constraints related to chicken production and marketing system in the study areas

The results presented in Table 3 indicates the opportunities of rearing chickens in the study areas, the major opportunities being access to market, followed by access to veterinary care (at Hawassa) and feed (at Yirgalem). The result pertaining to the major opportunities

Table 3. Opportunities for chicken production in the study areas (rank and index) (N=180).

Variable	Opportunities for Hawassa		Opportunities for Yigralem	
	PI	Rank	PI	Rank
Market access	0.48	1 st	0.46	1 st
Feed access	0.13	4 th	0.26	2 nd
Extension service	0.16	3 rd	0.15	3 rd
Veterinary service	0.23	2 nd	0.13	4 th
Total	1.00		1.00	

Priority index = $(F1*4) + (F2*3) + (F3*2) + (F4*1)$ divided by the sum of all counted values mentioned by the respondents.

Table 4. Constraints for chicken production in the study area (rank and index) (N=180).

Variable	Constraints for Hawassa		Constraints for Yigralem	
	PI	Rank	PI	Rank
Lack of feed	0.102	4 th		
Disease	0.32	1 st	0.27	1 st
Poor adaptability	0.31	2 nd	0.25	2 nd
Market	0.07	5 th	0.15	4 th
Awareness how to manage the chickens	0.198	3 rd	0.22	3 rd
Lack of improved breeds			0.11	5 th
Total	1.00		1.00	

Priority index = $(F1*5) + (F2*4) + (F3*3) + (F4*2) + (F5*1)$ divided by the sum of all counted values mentioned by the respondents.

related to both the studied locations (Table 3) indicate that the opportunities as indicated by the respondents are very encouraging, especially those accounting for the accessibility of veterinary and extension services, availability of feeds and marketing and the result is similar with the finding of Nebiyu (2016). The presence of all weather market is appealing as in many parts of the country (those predominated by the people practicing Orthodox Christianity) where market is seasonal (Ayalew and Adane, 2013; Emebet, 2016). Therefore, it is expected that the educated, unemployed and small-scale entrepreneurs' can take poultry farming as their means of livelihood. The opportunities at Yigralem too are more or less similar with a slight deviation in their ranking, which show that there is a scope for improvement of Veterinary care, which is one of the existing factors assuring profitability of the chicken farming and it is similar with the findings of (Feleke et al., 2015; Nebiyu, 2016).

The results presented in Table 4 indicate the constraints for rearing chickens in the study areas, the major constraints being the occurrence of the disease, followed by adaptability (especial for exotic chickens). Due to these reasons, most of the respondents of the study areas preferred rearing only local chickens. The results presented in Table 4 indicate the constraints for rearing chickens in both study areas are similar with

finding of Wondu et al. (2013). Aman et al. (2017) also revealed that constraints in poultry production in the study districts of the Wolaitta zone and Kambata Tambaro zone were disease followed by shortage of feeds.

In both locations, it would be better if the respondents can form self-help groups (SHG) or cooperatives which can help them procure feed (in bulk) from the factories besides availing credit facilities either from MFI (micro finance institutions) or banks (Ban et al., 2015). Establishment of such institutions can also help in arranging training programs besides also assist in marketing of the eggs, which can also assist in improving the poultry husbandry practices in the study areas. Importance of SHG's and cooperatives in improvement of livestock husbandry practices and marketing of livestock products have been reported by Varathan et al. (2012).

CONCLUSION AND RECOMMENDATION

The result of the present study on the urban poultry production and constraints as practiced in two selected towns of Southern Ethiopia. This study indicated that most of the households practiced both scavenging and indoor management with very few of them providing the

necessities like proper housing and balanced feed. Chickens in the study area are reared for home consumption followed by those reared for income. Additional feeds were offered to the chicken besides scavenging; water was provided adlib to the chickens. New castle and Coccidiosis diseases were a major threat and constraint to the profitability of the venture. Based on the above conclusion, the following recommendations were forwarded:

- (i) In urban poultry production, the cage system is essential rather than back yard production to produce more in small space. Also, it could improve sanitary condition of the flock because it helps to prevent diseases like coccidiosis and endoparasites.
- (ii) Feed and feeding system of the chicken should be corrected, by feeding chicken from local available materials.
- (iii) The government extension work and regular refresher courses have to be conducted by the Universities/ Research stations for further training of the development for study area to appraise the rearers about managing the exotic chickens.
- (iv) Government should create awareness on vaccination of chicken for the community, to provide wide spread vaccination against major poultry diseases in the study areas.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

- Abraham L, Yayneshet T (2010.) Performance of exotic and indigenous poultry breeds managed by smallholder farmers in northern Ethiopia. *Livestock Resource Rural Development*. 22(133). Retrieved September 10, 2017.
- Addisu H, Hailu M, Zewdu W (2013). Indigenous Chicken Production System and Breeding Practice in North Wollo, Amhara Region, Ethiopia. *Poultry, Fisheries and Wildlife Sciences* 1(2):1-9.
- Akililu N, Adem K, Getnet B, Abiy A, Kidane D, Birhanu M (2013). Popularization of Chicken Production in Smallholder Women Agropastoralist of Ethiopia: Case of Afar Regional State. Ethiopian Institutes of Agricultural Research, Werer Agricultural Research Center, Department of Agricultural Economics, Extension and Gender Research. P 12. Available at Website: www.eiar.gov.et.
- Alemayehu GS (2017). Characterization of scavenging and intensive chicken production and marketing system in Lume district, East Shoa zone, Oromia region state, Ethiopia. An MSc. Thesis, Haramaya University, Haramaya, Ethiopia P 163.
- Aman G, Bangu B, Bereket Z, Desta G, Abiti T, Edget A, Hamid J (2017). Production performance of Sasso (distributed by ethiochicken private poultry farms) and Bovans brown chickens breed under village production system in three agro-ecologies of Southern Nations, Nationalities, and Peoples' Regional State (SNNPR), Ethiopia. *International Journal of Livestock Production* 8(9):145-157.
- Ayalew M, Adane T (2013). Evaluation of indigenous chicken productivity by using a questioner survey, in selected Chagni town, Awi - administrative zone, Amhara Region, Ethiopia. *World Journal of Agricultural Sciences* 1(1):026-035.
- Bailey T, Larson J (2013). *Backyard Poultry: Implications for Public Health and Safety*. Food Policy Research Center. Accessed at September 4, 2017.
- Beall J, Fox S (2007). Urban poverty and development in the 21st century: Towards an inclusive and sustainable world .Oxfam paper, United Kingdom: Oxfam GBP.S.
- Desalew T (2012). Management practices, productive performances and egg quality traits of exotic chickens under village production system in East Shewa, Ethiopia. An MSc. Thesis, Addis Ababa University, Debre Zeit, Ethiopia P 70.
- Dirsha D (2009). Assessment of village Rhode Island Red chicken management practices in cheha woreda and evaluation of different levels of brewers dried grain on growth performance of the chicks. A thesis submitted to the School of Graduate Studies of Haramaya University, Haramaya, Ethiopia.
- Duncan DB (1995). Multiple Range and F tests. *Biometrics* 11:1-42.
- Emebet MB (2015). Phenotypic and genetic characterization of indigenous chicken in southwest Showa and Gurage zones of Ethiopia. PhD dissertation, Addis Ababa University, Addis Ababa, Ethiopia. p 127.
- Food and Agriculture Organization (FAO) (2007). Poultry sector country review, Animal Production and Health Division, Emergency center for trans-boundary animal diseases socio economics, production and biodiversity unit, Food and Agriculture Organization of the United Nations, Rome. Italy. Available at [ftp://ftp.fao.org/docrep/fao/011/ai320e/ai320e00.pdf](http://ftp.fao.org/docrep/fao/011/ai320e/ai320e00.pdf).
- Food and Agriculture Organization (FAO) (2008). Review of the new features of the Ethiopian poultry sector Biosecurity implications. By Paolo Pagani and Abebe Wossene, Rome, Italy P 29.
- Feleke A, Tekla T, Abeba D (2015). Challenges and Opportunities of Village Poultry Production in Arbegona Woreda, Sidama Zone, Southern Ethiopia. *Developing Country Studies* 5(11):71-78.
- Getu A, Birhan M (2014). Chicken Production Systems, Performance and Associated Constraints in North Gondar Zone, Ethiopia. *Journal of Fisheries and Livestock Production* 2(2):1-5.
- Gezahegn T, Ashenafi M, Berhan T (2016). Evaluation of the Egg Production Performance in Bovans Brown and Koekoek Chicken Breeds under Varied Seasons and Feeding Regimes in South Wollo Zone, Ethiopia. *Global Veterinaria* 17(4):318-324.
- Haftu K (2016). Exotic Chicken Status, Production Performance and Constraints in Ethiopia: A Review. *Asian Journal of Poultry Science* 10(1):30-39.
- Hawassa Bureau of Livestock and Fishery (Hawassa BoLF) (2016). Report, Hawassa city agricultural activities. (Unpublished).
- Hussein K, Suttie D, Bleicher Z (2016). Inclusive economic development and investment, markets, infrastructure and finance in rural and urban areas – Examples from Africa. Paper for a joint UNCRD-UN Habitat issue of the Regional Development Dialogue, Vol. 35 on "Urban-Rural Linkages in Support of the New Urban Agenda.
- Kish L (1965). *Survey Sampling*. New York: John Wiley and Sons, Inc.
- Mekonnen G (2007). Characterization of smallholder poultry production and marketing System of Dale, Wonsho and Loka Abaya weredas of southern Ethiopia. M.Sc. Thesis presented to the School of Graduate Studies of Hawassa University, Hawassa, Ethiopia P111.
- Melese GN, Melkamu B (2014). Assessment of Chicken Production under Farmers Management Condition in East Gojam Zone, Amhara Regional State, Ethiopia. *Greener Journal of Animal Breeding and Genetics* 1(1):001-010.
- Meseret M (2010). Characterization of village chicken production and marketing system in Gomma wereda, Jimma zone, Ethiopia. An MSc. Thesis presented to school of graduate studies of Jimma university, Jimma, Ethiopia P 110.
- Moges F, Abera M, Tadelle D (2010). 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* 5(13):1739-1748.
- Moreki JC, Dikeme R, Poroga B (2010). The role of village poultry in food security and HIV/AIDS mitigation in Chobe District of Botswana. *Livestock Research for Rural Development* 22(55). Retrieved August 10, 2016. From <http://www.lrrd.org/lrrd22/3/more22055.htm>
- Nigusie D (2011). Breeding programs for indigenous chicken in

- Ethiopia: analysis of diversity in production systems and chicken populations PhD Thesis, Wageningen University, the Netherlands.
- Nebiyu YA (2016). Assessment of urban poultry production practices in addis ababa with emphasis on egg production, product marketing, feed quality and waste management. PhD Dissertation, Addis Ababa University, Addis Ababa. Ethiopia P 174.
- Ravindran V (2013). Poultry feed availability and nutrition in developing countries: Poultry development review. Rome, Italy, FAO. pp. 60-63.
- Roberts SJ (1971). Veterinary obstetrics and genital diseases. 2nd edition. Published by the author. Distributed by Edwards Brothers, Ann Arbor, Michigan, USA. P 776.
- Ruxton C (2013). Value of Eggs during Pregnancy and Early Childhood. *Nursing Standard* 27:41-50.
- Srinath M (2009). Backyard Poultry for Empowering Rural Women. Directorate of Research on Women in Agriculture (Indian Council of Agricultural Research), Bhubaneswar - 751 003, Orissa, India P 36.
- Statistical package for social sciences SPSS Inc. (2007). SPSS for Windows, Version 16.0, Chicago, SPSS Inc.
- Tadesse D, Singh H, Mengistu A, Esatu E, Tadelle D (2013). Study on productive performances and egg quality traits of exotic chickens under village production system in East Shewa, Ethiopia. *African Journal of Agricultural Research* 8(13):1123-1128.
- Thomas PZM (2013). An evaluation of the performance of urban agriculture in Addis Ababa City, Ethiopia. *Research Journal of Agricultural and Environmental Management* 2(2):051-057.
- Tschirley D, Snyder J, Dolislager M, Reardon T, Haggblade S, Goeb J (2015). Africa's Unfolding Diet Transformation: Implications for Agrifood System Employment. *Journal of Agribusiness in Developing and Emerging Economies* 5(2):102-136.
- UN_HABITAT (2006). The state of the world cities urbanization: A Turning point in History Nairobi: United nation centre of human settlement P 108.
- Van Horne PLM, Achterbosch TJ (2008). Animal Welfare in Poultry Production Systems: Impact of EU Standards on World Trade. *World's Poultry Science Journal* 64:40-52.
- Van Veenhuizen (2006). Cities farming for the future: urban agriculture for green and productive cities. Leusden, RUAF/ IDRC/IIRR.
- Wondu M, Mehret M, Berhan T (2013). Characterization of Urban Poultry Production System in Northern Gondar, Amhara Regional State, Ethiopia. *Agriculture and Biology Journal of North America* 4(3):192-198.
- Yirgalem bureau of livestock and fishery (Yirgalem BoLF) (2016). Report, Yirgalem city agricultural activities (Unpublished).
- Zelnter E, Maurerv V (2009). Welfare of organic poultry. Poultry Welfare Symposium. Cervia, Italy, 18-22 May.