



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

INTERNATIONAL JOURNAL  
OF CURRENT RESEARCH

International Journal of Current Research  
Vol. 11, Issue, 05, pp.3553-3557, May, 2019

DOI: <https://doi.org/10.24941/ijcr.35041.05.2019>

## REVIEW ARTICLE

### REVIEW ON AVAILABLE FEED RESOURCES AND FEEDING PRACTICE OF VILLAGE CHICKEN: ETHIOPIA

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#### ARTICLE INFO

##### Article History:

Received 09<sup>th</sup> February, 2019  
Received in revised form  
12<sup>th</sup> March, 2019  
Accepted 15<sup>th</sup> April, 2019  
Published online 30<sup>th</sup> May, 2019

##### Key Words:

Feed Resources of Chicken  
Trends of Supplementary Feeding Practice  
of Village Chicken.

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Citation: Merhun Lamaro and Tagesse Sawo. 2019. "Review on Available Feed Resources and Feeding Practice of Village Chicken: Ethiopia", International Journal of Current Research, 11, (05), 3553-3557.

#### ABSTRACT

This review paper focuses on available feed resources, feeding practice, trends of supplementary feeding, nutritional constraints and water sources and watering practice of village chicken in Ethiopia. There is no purposeful feeding of chickens under the village conditions in Ethiopia and scavenging is almost the only source of diet. From different research reports or findings, the common existing feed resources are cereal grains (dominantly maize and sorghum) followed by wheat, rice, worms, insects, grass, vegetables. Village chickens are also supplemented with different available cereal grains and food leftovers or kitchen wastes and different parts of vegetables and fruits, leaves of green crops. Almost all of the smallholder farmers or chicken owners provide supplementary feed indiscriminately to all classes of chicken on bare ground or floor. Shortage of feed supply and poor nutritional quality, limited skill of feeding system, unaffordable cost of feed ingredients, indiscriminate feeding of the different age classes of chickens' together, lack of routine hygiene management, lack of clean water, water and feed trough are the major constraints of feeding. The objective of feed supplementation practice is mainly to increase egg yield, meat yield and to minimize mortality in some cases. River and rain water, tap and bore hall water, locally constructed underground water, spring, and well water are the major water sources of village chicken.

#### INTRODUCTION

The total chicken population of Ethiopia is about 57 million (CSA, 2014 /2015) and kept for both eggs and meat production purposes. Nearly all (99.27 %) are raised under a traditional management system (Halima *et al.*, 2007). Local chickens in Ethiopia plays a vital role in many poor rural households; they provide scarce animal protein in the form of meat and eggs and can be sold or bartered to meet essential family needs such as medicine, clothes, food items that are not grown under farmers' field, sanitary items like soap and school fees and they are required for special festivals and for many traditional ceremonies. They are generally owned and managed by women and children and are often essential elements of female-headed households. Improvement in chicken productivity can be achieved through identification of different available feed resources production, feed constraints and introduction of new technologies or by refining existing practices in the system Identification of feeding management activities with their constraints and opportunities associated to chicken production are preconditions for designing suitable chicken production development strategies (Haffernan, 2004). Prioritization of the feeding constraints is essential as it helps to use the scarce resources efficiently. Understanding the feeding practice helps to design appropriate technologies,

which they are compatible with the existing systems. In general, discussions of the chicken feeding practice are important to plan development and research activities and bring improvements in productivity. Even though there are different research reports or results studied on feed resources and feeding practice of local chickens in different parts/agro ecologies of Ethiopia, these information/results/reports need to be compiled or merged in more manageable/understandable way which may be used as input for different stakeholders involved in poultry /chicken production and improvements activities including smallholder farmers involved in village chicken husbandry. Summarized and synthesized information for the beneficiaries and users. Therefore, the objective of this review paper is to put recent and updated document or information on the feed resources availability and their feeding practice of scavenging chicken in Ethiopia.

#### REVIEW

**Feed resources of chicken:** In developing countries like Ethiopia, the overall standard of husbandry is mainly scavenging type and usually poor because of the low level of inputs and in addition, there are a considerable number of constraints to village poultry production (Tadelle, 2001). Scavenging is the major feed resource in extensive village

chicken production system. Birtukan *et al* (2014) reported that the dominant system of poultry feeding practiced in Ada'a and Lume districts of East Shewa. Family chicken production is an appropriate system that makes the best use of locally available resources (Tadelle *et al.*, 2010). Sefa *et al* (2016) also reported scavenging was the major feeding system practiced. Similarly, Halima (2007) reported that 99.27% of the chickens were managed under a traditional or extensive chicken management system in North-west Ethiopia. Village chicken also plays a role of converting household leftovers, wastes and insects into valuable and high quality protein (Dawit *et al.*, 2008; Doviet, 2005). Different feeding materials are present for scavenging including crop as visually observed, seeds, plant materials, worms, insects and unidentified materials (Tadelle and Ogle, 2010). The major source of chicken feed was also obtained from their house and cereal grains of maize and sorghum were the most dominant supplementary feeds and the amount of each being dependant on seasons of the year and the quantity and availability of the resources at the household level (Getu and Birhan, 2014; Desalew, 2012; Wondu *et al.*, 2013; Tsegay *et al.*, (2017). Different cereal grains, wheat and maize, mixture of wheat, maize and sorghum, and mixture of sorghum and maize (Sefa *et al.*, 2016; Halima *et al.*, 2007); maize, wheat, rice, rice and maize together (Kibreab *et al.*, 2015); wheat and maize grains in central and western highlands of Ethiopia (Dessie *et al*, 2013); maize, wheat, sorghum (Samson and Endalew, 2010); a hand full amount of grain (Wondu *et al.*, 2013); wheat grain, maize grain (Bangu, 2016) were reported supplementary feeds. However, the primary use of these cereal crops was for human consumption (Fisseha, 2009). But even if there were such kind of feed produced from their own farm, there was also competition with human as it has being available for human consumption so, that made high shortage of feed for the poultry production.

In addition to the above cereal grains farmers also supplement wheat bran and food leftovers like boiled *enset* locally called "*amicho*" and baked *enset* "*kocho*" (Sefa *et al.*, 2016); food leftover in the house including "*Kocho*" or baked *enset* (Kibreab *et al* 2015); kitchen wastes and bone meal (Dessie *et al*, 2013); household waste products (Samson and Endalew, 2010); bread, *injera*, covering of tomatoes, carrot, potatoes, vegetables and cooked foods (Wondu *et al.*, 2013); insects, grass and harvest leftovers (Tadelle *et al.*, 2003); worms, insects, grass, vegetables, and kitchen wastes eastern Ethiopia (Getachew *et al.*, 2015); cereal debris, kitchen left over's, "*kocho*" Bangu, (2016); green grass including "*keppo*" local name, weeds leaf, different cereals leaf, different fruit leaves, *enset* leaf, cabbage (Kibreab *et al.*, 2015); *enset* (*Ensete ventricosum*) and cabbage (Mekonnen, 2007); green grasses (Dessie *et al.*, 2013); household refusals (Wondu *et al.*, 2013) home meal/food leftovers (Kibreab *et al.*, 2015; Dessie *et al.*, 2013); insect, grass, *enset* (*Ensete ventricosum*), kitchen wastes/leftovers, and harvest leftovers in different parts of Ethiopia. Thus, the smallholder chicken production goes eco-friendly because they convert insects and household leftovers to valuable cheap and quality animal protein to the family. The kitchen left over's and scavenging type of feeding become only life reserving option for village chicken in Sidama Zone and Halaba Special Woreda, it is closely related with work done by Dwinger *et al* (2003), that family poultry production in Africa survives by scavenging and generally, no supplements provided except that some times, household waste fed to the birds and other circumstances the diet supplemented with grain.

**Trends of supplementary feeding practice of village chicken:** All the available evidences tend to indicate that scavenging feed resource base for local birds are inadequate and variable depending on season (Hoyle, 1992 and Alemu and Tadelle 1997). To make full use of the productive potential of scavenging chicken, a feed which is sufficient in both quality and quantity has to be provided. In Ethiopia, 99%, 97.5% and 98% feed supplementation by chicken owners were reported by Ermias T; Tsadik *et al* (2007). Samson and Endalew, (2010) Asefa (2007) and Mekonnen (2007) also reported that 95 -98% of the small scale household poultry producers offer supplementary feeding to their chickens. The trend of giving supplementary feed was reported to be three times a day (morning, afternoon and evening); (Kibreab *et al.*, 2015; Wondu *et al.*, 2013; Tadesse *et al.*, 2017; Birtukan *et al.*, 2014; twice a day (morning and afternoon); (Desalew, 2012; Bangu, 2016). There was statistically significant effect ( $p < 0.05$ ) among once, twice and thrice feeding frequency on egg productivity performance of layer chickens and reveal improved egg productivity in thrice feeding (Tadesse *et al.*, 2017). Smith (1990) also reported that productivity of the chicken could be affected by feeding frequency. Moradi *et al* (2013) indicated that twice and thrice a day feeding regimens rather than once a day improved egg production rate. Tadesse *et al* (2017) reported that chicken fed twice a day produced more eggs compared with chicken fed once a day and the chicken received their feed two or three times per day laid 4.8 eggs more than those that fed one time per day. Cave (1981) also indicated that feeding three times per day increased the percentage of chicken daily egg production.

Getu and Birhan (2014) reported almost all respondents practiced supplementary feeding of local chickens' spreading on the ground. According to Wondu *et al* (2013) almost all of the households provide supplementary feeds together and some provide separately for the different age groups. Some of the respondents use different old household utensils as feeding trough. Bogale, (2008) showed most of the households feed all classes together and some of them provide separately to the different classes which avoids competition among the different age groups. Bangu, (2016) revealed farmers fed their chickens on bare ground. According to Desalew (2012) almost all of the respondents provide home grown or purchased supplementary feed materials indiscriminately to all classes of chicken on bare ground which may cause adverse health problem due to contamination of feeds and increase competition among them.

**Feeding constraints of scavenging chicken:** There is no purposeful feeding of chickens under the village conditions in Ethiopia and scavenging is almost the only source of diet (Dessie and Oogle, 2000). Scavenging feed resource base for local birds is inadequate and variable depending on season (Hoyle, 1992; Alemu and Tadelle, 1997). The amount of feed available for scavenging in relation to the carrying capacity of the land areas and flock dynamics across the different seasons and agro-ecologies is still not adequately quantified. Kibreab *et al* (2015) reported that village chicken owners supply little or nothing by the end of dry season when the feed resource is becoming scarce in the house. Similarly, Tadesse *et al* (2017) reported most farmers do not use home-mixed ration due to lack of knowledge, cost of ingredients and unavailability of ingredients. According to Tsegay *et al.* (2017) almost all of the respondents have limited knowledge of the daily amount of feed given per chicken. Lack of feed supplementation is one of the characteristics of free-ranging backyard poultry production

system (Gueye, 2003). Shortage of feed supply and poor nutritional quality of available feed resources are the major constraints affecting chicken productivity Bangu, (2016). Both egg production and egg size vary with season, as the quality and availability of feed varies. According to Getu and Birhan (2014) farmers had no clear idea in terms of the quality and quantity of supplementary feeds. The crop analysis result indicated that the physical proportion of seeds is higher in the short rainy season and the concentration of crude protein; calcium and phosphorus are below the recommended requirements for egg production (Tegene, 1992; Tadelles and Ogle, 1996b; Alemu and Tadelles, 1997). According to the finding of Tadelles and Ogle (1996b), the scavenging feed resource is deficient in protein, energy and probably calcium for layer birds, indicating the role of supplementation in bringing a considerable increase in egg production. Spreading the grain on the floor was the major way of providing supplementary feed. Almost all of the respondents were feeding the different age classes of chickens together (Sefa *et al.*, 2016 Dessie, *et al.*, 2013; Wondu *et al.*, 2013). Sefa *et al.* (2016) revealed that none of the respondents reported to have regular feeding and watering troughs and had limited experience regarding routine hygiene and management. Lack of clean water is one of the main constraints of chicken production in Ethiopia (Getachew *et al.*, 2015; Dessie, *et al.*, 2013).

**Purpose of Supplementation of scavenging chicken:** Feed supplementation has been reported in various countries as a common practice to promote chicken performance: (Malawi; Ethiopia (Dessie and Ogle, 2001). At least 60g of feed supplementation is needed for the scavenging cross birds (Dessie and Ogle, 2001). Most of the reports confirm that chicken owners provide supplementary feed to increase egg yield and the rest provide supplementary feed to increase meat yield, considering broodiness and age of birds (Sefa *et al.*, 2016; Kibreab *et al.*, 2015; Bangu, 2016). The main objective of poultry keeping by villagers was production of eggs for marketing and for home consumption (Tadelles *et al.*, 2003). Farmers also believe that chickens provided with supplementary feed lay more eggs and chicks grow faster. In General, good supplementation accelerates growth rate, fertility, weight of chicken and avoid disease occurrence (Fisseha, 2009).

**Water Sources and Watering Practice of Scavenging Chicken:** Water plays an important role for feed digestion and metabolic activity of chickens. The majority of village chicken owners in different parts of Ethiopia provide water to village birds with locally available water trough (Kibreab *et al.*, 2015; Wondu *et al.*, 2013; Getu, and Birhan, 2014; Halima, 2007). The major sources of water reported for scavenging birds are river water, tap and bore hall water, rain water, pipe water, sewage from the house, well water, underground water, spring water, as the major water source (Birtukan *et al.*, 2014; Moges *et al.*, 2010; Mengesha *et al.*, 2011; Wondu *et al.*, 2013 ; Kibreab *et al.*, 2015; Fisseha, 2007; Solomon, 2013 Getachew *et al.*, 2015; Getu and Birhan, 2014 ;Samson and Endalew, 2010). Different reports indicated that almost all of the respondents provide water *ad libitum* for their chickens (Getu and Birhan, 2014; Kibreab *et al.*, 2015; Birtukan *et al.* 2014; Samson and Endalew 2010). Contrary to this report Desalew (2012) indicated about 98.3% of the respondents responded to provide water to their chickens once a day.

## Conclusion and Recommendations

Generally, the dominant village bird production system in Ethiopia is mainly scavenging type. There is no purposeful feeding of chickens under the village conditions in Ethiopia and scavenging is almost the only source of diet (Dessie and Oogle, 2000). This system is the major feed resource in extensive village chicken production system. Various types of locally available feed resources are reported including cereal grains dominantly maize and sorghum followed by wheat, rice, plant materials, worms, insects, grass, vegetables the amount of each being dependant on seasons of the year and the quantity and availability of the resources at the household level. However, the primary use of these cereal crops was for human consumption (Fisseha, 2009). Therefore, there is competition with human so, that made high shortage of feed for the poultry production. Village chickens are also supplemented with wheat bran and food leftovers or kitchen wastes like boiled *enset* and baked *enset*, kitchen wastes and bone meal, bread, *injera*, parts of vegetables and fruits, leaves of green crops/grasses. Thus, the smallholder chicken production goes eco-friendly because they can convert insects and household leftovers to valuable cheap and quality animal protein to the family.

Most of (95-99%) the smallholder farmers in Ethiopia practiced feed supplementation to their chicken. The trend of giving supplementary feed was reported to be mostly thrice followed by twice and once per a day. Almost all of the smallholder farmers or chicken owners provide supplementary feed indiscriminately to all classes of chicken on bare ground which may increase competition among them and cause adverse health problem due to contamination of feeds. The trend of using cleaned feed trough and water trough is not advanced. The constraints related to feeding or nutrition of scavenging birds are shortage of feed supply and poor nutritional quality of available feed resources, limited skill of feeding system, unaffordable cost of ingredients and unavailability of ingredients, scarcity of supplementary feed, spreading the supplementary feeds on the ground, feeding the different age classes of chickens together, lack of routine hygiene and management, lack of clean water. Feed supplementation has been reported in Ethiopia to increase egg yield, meat yield, considering broodiness and to minimize mortality. The water sources of village chicken in Ethiopia are tap and bore hall, sewage from the river, rain, tap, pipe, locally constructed underground water, spring, and well water.

**Depending on this review the following recommendations can be forwarded to improve the productivity of scavenging birds;**

- It is important to use modernized feeding system with improved technology in feeding
- Improvements should be done in frequency of feed supplementation to chicken should be prioritized as the frequency increased productivity is also improved
- Producers should use feed storage systems for dry seasons to avoid seasonal scarcity of feed
- Feeding and watering practice should be improved as most of them do not use water and feed trough and even not cleaned materials
- Chicken owners should be trained regarding the feed requirement and feeding practice of their birds
- Different stakeholders should work in closed manner

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