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RESEARCH ARTICLE

POPULATION, DISTRIBUTION AND CONSERVATION STATUS OF ECOTYPE INDIGENOUS CHICKEN IN ETHIOPIAN

*Abebe Hailu, Abraham Assefa and Amine Mustefa

Ethiopian Biodiversity Institute, Addis Ababa, Ethiopia, P.O.Box 30726

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ABSTRACT

Ethiopia is known for the diversity and wealth of indigenous domestic animals that enhanced livestock sector which has been contributing considerable portion to the economy of the country. Chicken are among the economically important livestock species which are most widely spread and dominant poultry species. Since local chicken have good potential to adapt in different agro-ecology and provide luxurious source of family protein and income to rural poor households in Ethiopia, promoting the resources using scientific journals, research publications, manuals, policies and strategic documents will have paramount importance to enhance the benefit of the sector to the society. Therefore, this review is, aimed to be carried out to briefly reveal the status major ecotypes of chickens so far identified and their population and geographic distribution, as well as the potential reproductive performances of chicken. Moreover, the review tried to address the economically important production constraints including but not limited to disease, feed and nutrition, markets access and indiscriminate cross breeding with less adaptive exotic chicken breed. This review clearly showed that there is still a need to carry out intensive characterization and identification research both at phenotypic and DNA (genetic) levels to exhaustively identify chicken ecotype of the country. It is also important that researchers, development workers and policy maker work together to put practical and workable strategy to improve, conserve and sustainably utilize the genetic resources for the good of the community.

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INTRODUCTION

Ethiopia has the largest livestock population size in Africa, is believed to be center of plant and animal diversity because of its diverse agro-ecology, habitat to different species and animal breeds. Some of the factors that are considered to contribute for the diversification of livestock resources include the geographical location, presence of contrasting agro ecologies, the rich agro ecosystems created by the various cultures and their interaction (EBI, 2016). There are different production systems being practiced in the country, mixed crop livestock, pastoral and specialized urban and peri-urban production systems are the major once. Ethiopia is also known for its diversity and wealth of indigenous domestic animals which has been contributing a considerable portion to the economy and it contribute 16-19%, 35-40% of the national and agricultural gross domestic product (GDP) respectively (FAO, 2019).

In Ethiopia, chicken are the most widely spread and dominant poultry species. Local chicken have good potential to adapt in different agro-ecology and provide luxurious source of family protein and income to poor rural households. Moreover, local chicken genetic resources in Ethiopia play significant role in poverty alleviation and other religious or cultural reasons (Bogale, 2008; Reta, 2013). Ethiopia is among the developing countries where their indigenous chicken are closely related to red Jungle fowl. There is no comprehensive information on the categories of breed identities and geographical distributions of many animal populations including chicken in the developing countries in general and Ethiopia in particular (FAO, 2011). Chicken ecotype characteristics are non-descriptive type and varied in color, comb type, body conformation and weight (Tadelleand Alemu, 1997). Village chicken is usually kept under free ranging production system. Indigenous chicken is characterized by poor appearance, relatively having low productivity, slow growth rate, small adult size and lays small eggs. Thus, they are neglected from comprehensive research, development and policy issues to put them in the research and development programs.

*Corresponding author: Abebe Hailu,

Ethiopian Biodiversity Institute, Addis Ababa, Ethiopia, P.O.Box 30726.

MATERIALS AND METHODS

This review has mainly used scientific journals and research publications. Moreover, manuals, policies and strategic documents and unpublished working documents were reviewed.

Population size and distribution of chicken in Ethiopia: World's chicken population size is estimated to be about 16.2 billion of which 71.6% were found in developing countries (Getachew *et al.*, 2012). Ethiopia is one of the African countries with a significant population of 56.06 million chicken and it covers about 60% of the total population (Addis *etal.*, 2015). Regarding breed category, 88.19%, 6.45% and 5.36% of the total chicken was reported to be indigenous, hybrid and exotic breeds, respectively (CSA, 2018) in table 1.

Table 1. Local chicken population size in millions by breed in Ethiopia

Years	Total	Breed		
		Indigenous	Hybrid	Exotic
2010	49.9	97.3	0.38	2.32
2012	47.6	97.0	0.58	2.42
2013	54.2	96.8	0.81	2.37
2014	57.2	96.9	0.54	2.50
2017	59.5	94.3	3.21	2.49
2018	60.1	88.2	6.45	5.36
2019	59.5	54.1	2.83	2.61
2020	49.0	40.0	5.31	3.63

Source: Adapted from Central Statistical Agency (CSA, 2010 – 2020).

Geographical distribution of chicken indifferent regions of Ethiopia: Ethiopia owns about 60% of the total chicken population of East Africa, which is estimated about 59,499 million, that includes local, hybrid, and exotic chicken breeds of 90.9%, 4.8%, 4.4% of the total chicken population to be indigenous, hybrid and exotic, respectively (CSA, 2017). But the total chicken population in the country in (CSA, 2014) was estimated to be 56.5 million with native chicken representing 96.9%, hybrid chicken 0.54% and exotic breeds 2.56% which indicates that pure indigenous proportion decrease through time. Distribution of the total chicken population among the different regions of Ethiopia in (CSA 2017) have shown in Table 2. The estimated number of populations indicate that Oromia region has the largest number of chickens, followed by Amhara. The SNNPR, Oromia, Tigray and Amhara regions together represent 96 percent of the total national chicken population. The remaining 4 percent are mainly distributed among Afar, Somali, Benishangul Gumuz and Gambella regions. Almost all of the exotic and hybrid chickens are found in the Oromia, and Amhara, SNNPR and Tigray regions (FAO 2019). Currently, indigenous chicken genetic resources represented nearly about 91 percent of the total national chicken population. The chicken populations from the different study regions showed that a large variation in body structure, feather distribution, and plumage color, comb type, production and productivity (Tadelle and Ogle 2001). The same authors state that there are many ecotypes, breeds and strains of indigenous poultry that are well adapted to their production environments in the tropics. According to the report of Getu and Birhan (2014), the Flock structure of indigenous chickens are composed of Chicks, Pullets, Cockerels, Hens, and Cocks with an estimated mean of about

9.07 ± 0.59 , 2.47 ± 0.26 , 1.02 ± 0.15 , 2.79 ± 0.19 respectively with a total 16.43 ± 0.92 population per households.

Major Ethiopian Indigenous Chicken Ecotypes in Which Identified and Characterized So Far: Most of the identified chicken genetic resource so far are undocumented. However, according to DAD-IS and DAGR-IS, few Ethiopian indigenous chicken ecotypes where listed such as Tilili, Horro, Chefe, Jarso, Tepi, Gelila, Debre-Elias, Melo-Hamusit, Gassay/Farta, Guangua, Mecha, Konso, Mandura, and Sheka (Addis *et al.*, 2015). According to the Ethiopian Biodiversity Institute (EBI, 2016) only 7 ecotypes were registered as Ethiopian chicken ecotypes/breed in the DADIS. According to the report by Wondmeneh *et al.* (2016) as cited in FAO (2019), exotic chickens were first introduced into Ethiopia in 1953 and 1956 by Jimma Agricultural and Technical School and Alemaya College of Agriculture, respectively. There are no comprehensive current and previous conservation and breeding programs that targets indigenous chicken genetic resources development in the country, except some awareness creation campaigns at farmers level and limited attempts made on indigenous chicken improvement eg. Horo chicken. On the other hand, little or insufficient efforts were made to the selection based genetic improvement of indigenous chicken populations due to the vast importation of exotic chicken genetic resources (White and brown Leghorns, Rhode Island Red, New Hampshire, Cornish, Australorp Light Sussex). Therefore, conservation practices were given less consideration (Alemneh and Getabalew, 2019). This uncontrolled distribution of the exotic chicken genetic resources over the country leads to the dilution of the indigenous chicken genetic resource. Still intensive research on both phenotypic and DNA (genetic) levels has to be conducted to know the extent.

Reproductive performance of Ethiopian indigenous chicken ecotypes: Age at sexual maturity in chicken is 21 weeks of age and generation interval is about one year. The female chicken can produce one fertile egg per day with few non-production days per year (Zewdu 2013). Embryonic development begins outside of and unattached to the dam's body. It allows continuing ovulation during the incubation period which lasts only three weeks before hatching. Exploitation of chicken reproductive biology via selection and crossbreeding techniques superimposed with its fast generation interval and high reproductive rate have transformed poultry into industry.

It may be termed as a "living machine or factory". The reproductive biology of indigenous chickens is less exploited but still has important qualities. Like ideal mothers, good setters, hatch their own eggs, excellent foragers and vigor. They are aggressive, hardy and possess some degree of natural immunity against some diseases. These ideal factors are important requirements for replication and sustaining their generation in scavenging nature (Reta 2009, Zewdu 2013). The reproduction performance of local chicken has shown in (Table 3).

Economically important production constraints of local chicken in Ethiopia: Ethiopian chicken production system is subsistence type in which it is dependent on indigenous breeds, low input and low output that is dependent on natural resources (free grazing) and not market oriented.

Table 2. Distribution of chicken ecotypes in different region of Ethiopia

Geographic Area	Total	Breeds		
		Indigenous	Hybrid	Exotic
Oromia	20 408	19 604	513	291
Amhara	19 962	18 020	1 012	930
SNNP(south nation nationalities people region)	11 197	9 997	715	485
Tigray	5 746	4 288	566	892
Sub total	57 313	51 909	2 806	2 598
% of the country's total	96	96	99	99.7
Benshangul, Gumuz, Gambella,, Afar,, Harare, Dire. Dawa ⁻ sum total	2 186	2,151	27	8
% Country total	4	4	1	0.3
Country's total	59,499	54, 060	2,833	2,606

Source: FAO (2019)

Table 3. Reproductive performance of local chickens of Ethiopia under scavenging system

Reproductive characteristics	average Performance
Length of laying phase	10 -20 days
Incubation period	21 days
Clutches /hen per year	2-3 times
Inter-clutch interval (Clutch length)	60-105 days
Eggs laid/hen/ clutch at on farm	10 -20 eggs
Eggs laid/bird/year on farm	30-60 eggs
Eggs laid/bird/year on station	54-107 eggs
Hen-day production on farm	36%
N ^o . of eggs set for hatching on farm	13.31-13.69 eggs
N ^o . of chickens hatched/set eggs	9.09-9.51 chick
Fertility of eggs collected from market	36.2%
Fertility at research station (on station)	53-76%
Hatchability of eggs set from market	23.7%
Hatchability of fertile eggs from market	62.3%
Hatchability of eggs set at on station	39-52.5%
Brooding period	56 days
No. of chicks weaned (Survival rate at 8 th wk)	4-5 chicks
Age at sexual maturity	21 weeks (147 days)
Age at first egg	153-230 days (21.8weeks)
Weight at first egg	1-1.47 Kg
Generation interval	365 days (1yr)

Source: Reta 2009, and zewdu 2013,

Thus the major constraints that harper production and productivity of the sector are listed as follows:

Disease: High incidences of chicken diseases, mainly (NCD), coccidiosis, salmonellae's fowl pox

Feeds and nutrition: Feeds and nutrition is practiced in a traditional system in most part of the country in which village chicken production systems usually kept under free range system and their feed is obtained through scavenging. The major feed resource are insects, worms, seeds and plant materials, with very small amounts of grain and table leftover supplements from the household. This is mainly due to the less attention given to the sector.

Predators: Predators are widespread problems throughout the country, especially when chicks at younger stage.

Poor access to markets: This was mainly due to the weak institutions, and lack of skills and knowledge

Genetic erosion (dilution): Indigenous chicken possesses poor appearance, relatively low productivity, slow growth rate, small adult size and lays small egg size, and hence they are not getting due attention by concerned bodies for developing breeding strategies and policies to conserve and sustainably utilize local chicken genetic resources. High rate of genetic erosion caused due to unlimited and non-traceable intercrossing of exotic or/and between local breeds. This is mainly due to the lack of well-designed selection and breeding programs that helps to utilize the wider variability among

indigenous genetic resources for future improvement of local chicken.

Practical activities to carry out for conservation and sustainable utilization of local chickens

- Put in place proper chicken management system in all areas of production systems.
- Proper conservation and use of local chicken genetic resource has to be practiced and for that community-based improvement program through selection need to get more attention.
- More emphasis should be given to chicken genetic resources by researchers, developmental workers and policymakers
- There is a need to design and implement research and conservation program and document the results and most of the phenotypic characterization that have been carried out should be supported by genetic characterization DNA level..

Conclusion and recommendation

The diverse agro ecology and agronomic practice prevailing in Ethiopia together with the huge population of livestock in general and chicken genetic resources in particular, could be a promising attribute to boost up the sector and increase its contribution to the total agricultural output as well as to improve the living standards of the poor livestock keepers.

Even if, Ethiopia owned huge chicken flock; there are different factors like diseases, predators, lack of proper healthcare, feed scarcity, poor market information, indiscriminate crossbreeding, interbreeding and lack of well-designed selection and improvement programs have limited the contribution of the sector. In general, the population number of exotic breeds are increasing which have imposed the pressure on local chicken ecotypes and aggravating the dilution of the indigenous chicken resource. Therefore, it is very important that researchers, development workers and policy makers has to put practical and concrete consideration of local chicken improvement, conservation and sustainable utilization and development programs to improve the contribution of the sector and hence the livelihood of the community.

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