Review on Ethiopian Poultry Origin, Domestication, Classification and Characterization of Its Production Systems

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Abstract: Survey was conducted in Ethiopia. Current secondary data was considered. The data reported that Ethiopia is the first in Africa and tenth the world in livestock populations. Whereas, the review work investigated that poultry species are originated from south East Asia and domesticated from red jungle fowl. Four wild species of the jungle fowl is existed such as the red jungle fowl (G. Gallus), the grey jungle fowl (G. sonnerrati), the Ceylon jungle fowl (G. Lafayettei) and the green jungle fowl (G. varius). Indigenous chickens don’t have phenotypic standards and their classification is given based on colors and name of place where they are identified. Extensive production systems is the dominant management practices of chicken with small feed supplementation. High incidence of chicken diseases, mainly (NCD) is the major and economically important constraints for village chicken production systems followed by feeds. The average eggs laid/year/hen is not more than 60 eggs. Seasonal outbreaks of diseases, feed quality and quantity are the two major constraints of chickens’ production systems. Women are responsible in managing chickens in all aspects. Therefore, emphasis should be given in alleviating constraints like breeding systems, organizing input supply system for chicks, feeds, vaccines and veterinary drugs for chicken and eggs. The production system is still extensive and low in performances are the major character of indigenous genetic resources.

Key words: Chicken Production Constraints Performances

INTRODUCTION

Ethiopia is the first in Africa and tenth the world in livestock populations. Poultry species are originated from south East Asia and domesticated from red jungle fowl [1, 2]. Poultry include all domestic birds such as chickens, turkeys, ducks, geese, ostriches, guinea fowls, doves and pigeons. However, in this country except chickens the others are found in their natural habitat whereas geese and turkeys are not common [3]. Poultry contribute important socio-economic roles for food securities, generating additional cash incomes and religious/cultural reasons [4]. In Ethiopia chicken populations are estimated about 49.3 millions [2]. Indigenous chickens are largely dominated flock size and have good potential to adapt different agro-ecologies through habitual management systems [5]. But, they are non descriptive types and vary in body size, conformation, plumage color and other phenotypic characteristics [6, 7, 8].

Still these large population indigenous chickens are found in traditional production systems. However, they are well adapted to the tropics, resistant to poor management, feed shortages, tolerate to diseases and provide better test of meat and eggs than exotic chickens [9]. There is no well developed breeding practice in chicken production in Ethiopia. However, farmers in the view to increase meat and egg production follow their own breeding practice according to Nigussie [10] the breeding practices of farmers were allowing cocks and hens to mate indiscriminately without systematic mating. The other practice was the use of improved exotic breeds crossing with local ecotypes. Nevertheless, their effects on upgrading of the village chicken performances have been minimal. This is because the programs were usually planned without participation of farmers, with no parallel improvement of feeding, housing and health care and typically lasts for short time [11, 12, 13]. There has been number of reports on the constraints which played
significant role in loss of poultry population. Among these are disease and predation [7], market system [13], management and production system [8]. Some researchers have made chicken production systems, origin and associated constraints in different parts of Ethiopia. However, the above mentioned results are not presented in the organization form. Therefore, this review work was carried out to identify poultry origin, domestication, production systems and associated constraints.

**Classification of Indigenous Chickens:** There is no comprehensive information on the categories of breeds identities and geographical distributions of many animal populations including chicken in the developing countries of the world, thus some of them are commonly referred to as non-descript breeds [19]. Ethiopia is parts of developing country and its indigenous chickens are closely related to red Jungle fowl. However, breed characteristics are non descriptive type and varied in color, comb type, body conformation and weight [5]. Therefore, indigenous chickens don’t have phenotypic standards and their name was given based on colors and name of place where they are identified such as Tukor (black), Kei (red), Gebsima (Grayish mixture) and Netch (white) in terms of their plumage colors [20, 13] and based on place Tadelle [2003] at Tilili, Horro, Chefe, Jarso and Tepi, Halima [7] at Tilili, Gelila, Debre-Elias, Melo-Hamusit, Gassay/Farta, Guanguna and Mecha and Nigussie [10] at Farta, Konso, Mandura, Horro and Sheka. Furthermore, they are characterized by pronounced broodiness (maternal instinct), slow growth rate, late sexual maturity and low production and reproductive performances [6].

**Chicken Population in Ethiopia:** Poultry include all domestic birds kept for the purpose of human food (meat and eggs) production including chickens, ducks, ostrich, guinea fowl, doves and pigeons. Total chicken population consisting indigenous, exotic and hybrid chickens [2]. However, among the three chicken breed types indigenous chickens are dominant having large population size in Ethiopia (Table 1). The same source indicated that about 28.5% and 6.5% of the total chicken population were accounted in Amhara region and North Gondar administrative zone, respectively.

According to the report of Tadelle et al. [21] in general indigenous chickens are the predominant poultry species in Ethiopia. Rural farm households do not keep other domesticated birds (such as turkey, guinea fowl, ducks or geese). The same study indicated that the mean number of breeding females per households was 5.4 and the overall male to female ratio of the village flocks was 1:2.5. In addition to the breeding structure the average flock size of indigenous chickens kept per rural family was varied from 6 to 10 [7]. But, Nigussie [10] reported that the average estimated size of indigenous flocks per household was only 2.1 in Konso and 6.5 in Sheka with the average flock size of 3.5.
Table 1: Estimated number of chicken population by type and breed in Ethiopia

<table>
<thead>
<tr>
<th>Types of chicken</th>
<th>Number</th>
<th>%</th>
<th>Number</th>
<th>%</th>
<th>Number</th>
<th>%</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All chickens</td>
<td>49,286,932</td>
<td>100</td>
<td>47,954,978</td>
<td>97.3</td>
<td>1,143,922</td>
<td>2.32</td>
<td>188,032</td>
<td>0.38</td>
</tr>
<tr>
<td>Cocks</td>
<td>5,614,700</td>
<td>11.39</td>
<td>5,453,314</td>
<td>11.06</td>
<td>122,810</td>
<td>0.25</td>
<td>38,576</td>
<td>0.08</td>
</tr>
<tr>
<td>Cockerels</td>
<td>2,771,221</td>
<td>5.62</td>
<td>2,693,888</td>
<td>5.47</td>
<td>68,936</td>
<td>0.14</td>
<td>8,397</td>
<td>0.02</td>
</tr>
<tr>
<td>Pullets</td>
<td>4,878,184</td>
<td>9.9</td>
<td>4,728,009</td>
<td>9.59</td>
<td>126,119</td>
<td>0.26</td>
<td>24,056</td>
<td>0.05</td>
</tr>
<tr>
<td>Non layer</td>
<td>1,834,686</td>
<td>3.72</td>
<td>1,780,122</td>
<td>3.61</td>
<td>43,208</td>
<td>0.09</td>
<td>11,355</td>
<td>0.02</td>
</tr>
<tr>
<td>Chicks</td>
<td>18,294,799</td>
<td>37.12</td>
<td>17,927,274</td>
<td>36.37</td>
<td>351,966</td>
<td>0.71</td>
<td>15,560</td>
<td>0.03</td>
</tr>
<tr>
<td>Layers</td>
<td>15,893,342</td>
<td>32.25</td>
<td>15,372,372</td>
<td>31.19</td>
<td>430,883</td>
<td>0.87</td>
<td>90,087</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Source: [2]

Table 2: Production performance of indigenous chicken

<table>
<thead>
<tr>
<th>Performance</th>
<th>Site</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 to 60 eggs/hen/yr</td>
<td>WADU</td>
<td>[42]</td>
</tr>
<tr>
<td>34 eggs /hen/yr</td>
<td>Asella</td>
<td>[40]</td>
</tr>
<tr>
<td>18-57 eggs/year/ hen</td>
<td>Northwest Ethiopia</td>
<td>[7]</td>
</tr>
<tr>
<td>55.2 egg/hen/yr</td>
<td>Southen Ethiopia</td>
<td>[30]</td>
</tr>
<tr>
<td>36 eggs /3cluch/yr</td>
<td>Fogera</td>
<td>[13]</td>
</tr>
<tr>
<td>3.78 ± 0.07 clutch /yr</td>
<td>Bure</td>
<td>[41]</td>
</tr>
<tr>
<td>53-60 egg/hen/yr</td>
<td>Northwest Ethiopia</td>
<td>[43]</td>
</tr>
</tbody>
</table>

WADU = Wolaita Agricultural Development Unit

Poultry Production Systems in Ethiopia: Chicken production system is an appropriate and locally available resource in livestock populations. In Africa, Ethiopia is the highest in chicken population (Tadelle et al., 2003b). From sub-Saharan Africa 85% of all households keep chicken under free range/ extensive system, with women owning 70% of it, providing insufficient animal protein in the form of meat and eggs as well as being a reliable source of cash income [22, 23].

Ethiopia is one of the few African countries with a large population of chicken and covers 60% of it [24]. However, the number of chicken flocks per household in most Ethiopian rural communities is small; constituting an average of 7-10 mature chicken, 2-4 adult hens, cockerels and number of growers of various ages [9]. Traditional production system of local chickens is common and characterized by their low input and low output levels [5, 25].

Alemu [26] reported that poultry production systems in Ethiopia were grouped in to traditional and modern production systems using relatively advanced technology. Traditional poultry production system is characterized by no feed supplementation, small flock size and periodic devastation of the size by disease and other constraints [25]. There is no habit of providing supplementary feed and separate poultry house; the chickens live in family together with human beings. The main feed resource in scavenging chicken was thought to be insects, worms, plants, seeds, etc. with very small amount of grain, harvest and table left over supplements from the household and characterized as low input and output [11].

There is no selection and control breeding; only adopted in natural incubation and brooding hens are hatched and raised chicks all over the rural Ethiopia. A broody hen hatching, rearing and protecting little number of chicks (6-8) stop egg laying during the entire incubation and brooding periods of 77 days are the character of traditional, production systems [25]. So far the successes of the hatching and brooding process depends on the maternal instinct of the broody hen and prevalence of predators in the area[26], such as birds of prey, pets and some wild animals and all of which are listed as the major causes of premature death of chicks in Ethiopia [27, 28]. NCD is the most important cause of economic loss during production since vaccination is provided only in response to an outbreak in the traditional poultry production system [28].

The modern poultry sub-sector comprises of the small scale intensive and large scale commercial production systems. The small scale intensive poultry is newly emerging system in urban and peri-urban areas, where either broilers or egg type exotic breeds of chicken are produced along commercial lines using relatively modern management methods. This activity is being undertaken as a source of income in and around major cities and towns such as Debre Ziet. Most of these farms obtain their feeds and foundation stocks from the large scale commercial poultry farms and involved in the supply of table eggs to various supermarkets, kiosks and hotels through middlemen [25].

In general village chickens are kept under free ranging systems, where the main source of their feed is obtained through scavenging: such as insects, worms, seeds and plant materials, with very small amounts of grain crop and table leftover supplements from the household [9]. The feed content and supplementation, watering, sanitation, health care and housing are the major
management problem of backyard poultry production systems [29]. In chemical analysis of the poultry feed content; thirty hens were slaughtered in three seasons (short rainy, rainy and dry) and the crop contents were subjected to physical and chemical analysis. The physical analysis showed that the proportion of seeds was higher in the short rainy season and plant materials during rainy season. During the short rainy season and dry seasons concentrations of CP and calcium deficiency were more critical problem in egg production and the diets were even more unbalanced if energy to protein and calcium to phosphorus ratios are taken into account [9].

Breeding Objective and Practices: Importance of chickens, farmers’ trait preference and identifying production environments are important information to implement breeding schemes in back yard chicken production systems in Ethiopia [10]. Breeding objective is linked to be genetic improvement of different character as practicing selection criteria including economically important traits related to plumage color, body weight [38], adaptation, reproductive performance and egg number [23, 39, 10]. Production of eggs for consumption is the principal function of chicken production in Ethiopia followed by source of income and meat for home consumption [7, 10].

Marketing Systems: In Ethiopia marketing system is not integrated with type and amount of products, size of producers, marketing infrastructures, policy/institutional environments, dominated by backyard indigenous chickens and more demanded during holidays and end of fasting seasons [30, 7]. However, the price is being generally low during rainy season due to high risk of diseases and shortage of farmers’ disposable cash income [8]. During transportation, the chickens may be kept along with other bags sacks of grain bundles of firewood etc by binding their legs together that can result in considerable lose due to stressful conditions and physical injury [30, 13]. In the report of USAID [31] mostly poultry is owned and operated informally by children or women.

Traditional Breeding Practice in Ethiopia: Farmers have their own criteria and strategies of culling and selecting chickens that are being practiced at any time of the year [7]. Mainly farmers cull their chickens for home consumption, religious sacrifices and as a source of income through selling. All farmers in different regions traditionally give greater selection emphasis for breeding and replacement males and females such as plumage color, live weight, comb type, conformation and laying performance of their parents [7, 10].

Breeding, farmers in the Amhara (Farta) and Oromia (Horro) regions give the highest emphasis for plumage color while in the southern region (Konso and Sheka) live weight is used as the most important selection criteria. The emphasis given to each trait category is largely similar across the sexes except that, unlike for males, live weight is most important in Mandura and almost equally important to comb type in Farta for selecting breeding females [10]. Even if farmers have their own breeding and selection criteria, there is no designed selection and controlled breeding of village chickens. Thus, breeding of village chickens is completely uncontrolled [25]. Those local chickens are small in number per HH and the number of breeding male birds in each household was less than required for breeding purpose that alleviate inbreeding rate [11, 21].

Modern Breeding Practice in Ethiopia: Even if there is no recorded evidence indicating the exact time and locations of introduction of the first batch of exotic breeds of chickens into Ethiopia for genetic improvement, it is widely believed that the importation of the first batch was done by missionaries [25]. The first four breeds of exotic chicken (Rhode Island Red, Australoup, New Hampshire and White Leghorns) were imported to Jimma and Alemaya College of Agriculture in 1953 and 1956,
respectively under USAID project [28]. In the 1980s the
Ministry of Agriculture initiated importation and
distribution of cockerels to be used as breeding males in
villages. This scheme again failed because farmers were
unwilling to remove their local cocks and the exotic cocks
failed to adapt in the village environments [10]. Hence the
indigenous chickens are better in adapting harsh
environment, disease tolerance and brooders but poor in
reproductive performance [10]. To improve the
performance of local chicken additional exotic breeds
were imported such as (White and brown Leghorns,
Rhode Island Red, New Hampshire, Cornish, Australoup,
Light Sussex etc.) crossing with local chicken [10].

Performances of Indigenous Chicken in Ethiopia:
Indigenous chickens are poor in productive and
reproductive performance which are characterized by
small sized eggs, slow growth rate, late maturity, slow age
at first mating, small clutch size, a natural learning to
broodiness and high mortality of chicks among the flock
structures [13, 41, 25].

Egg Production: In Ethiopia the total 99% of egg
production is contributed by local chickens with an
average annual output of 78,000 metric tons [21].
According to Kidane [42] the average annual egg
production potential of indigenous chicken at Wolita
agricultural development unit was ranged between 30-60
eggs under village free range production systems. At
Asela Brannang and Pearson [40] discovered that the
average egg production of local birds was 34
eggs/hen/year with average egg weight of 38g. However,
at station numbers of eggs were enhanced to 80-100 with
improved environmental systems [32]. According to
Bogale [13] the average number of eggs incubated/hen
was 13. Under the present condition laying hen needs
about 120-130 days to accomplish one production cycle
that is 40-50 days of laying, 21 days of incubation and
60 days of brooding chicks. The age in which local chicks
reach at age at first egg laying is variable. This variation
could be attributed to genotype, management and season.

Meat Production: Only few research results are available
on the meat production abilities of local chickens [6].
Poultry meat and egg production account for more than
28% of the total animal protein produced in world in
1997 [13]. In 2020 the proportional contribution of poultry
meat is believed to be increased to 40%, the major
increment is being happened in the developing world
[44]. In Ethiopia from the total chicken meat production
about 99.2% of meat productions are contributed by local
chickens with an average annual output of 72,300 metric
tons [21, 12]. Day old chickens of different populations of
indigenous chicken measures live weight of 27.3g per
chicken [7, 13]. Nigussie [10] in adult live body weight of
the different populations of indigenous local chickens
also reported 1.6 kg for male and 1.3 kg for females.

According to the result of Bogale (2008) who
indicated that the meat production ability of indigenous
chicken was limited in growth performance. Local males
may reach 1.5 kg live weight at 6 months of age and
females about 30% less [13]. In addition, Teketel (1986)
reported that the local stocks reached 61 % and 85 % of
the body weight of White leghorn (WLH) at 6 months of
age maturity. In another study, Abebe [45] found that the
local chicken in Eastern Ethiopia attained 71.5 % of the
body weight of WLH at 6 months of age. In another study,
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local chicken in Eastern Ethiopia attained 71.5 % of the
body weight of WLH at 6 months of age. Solomon [46]
reported that there was no difference between White
Leghorn and indigenous chickens raised under
scavenging condition in mean daily body weight gain at
2 months of age. He also reported that the indigenous
chickens are sold for meat purpose starting from 6-8
months of age at weight of around 0.7-1.4kg. But, the
amount and protein contents of chickens’ meat fall during
dry seasons [9].
CONCLUSION

Poultry species are originated from south East Asia and domesticated from red jungle fowl. Chicken production system in the study area was mixed crop-livestock production system using through traditional management of indigenous chickens. The presences of various predators and diseases prevalence were the two major economic important of chicken production constraints. Chickens prices are not always constant which associated with whole days and the fasting situations of the people and festivity of the society. The usual market chicken owners were obtained better prices from matured chickens and from Quara and Tache Armacheho than Alefa districts. The performance analysis showed that Necked neck and Gasgie ecotypes were found better in both productivity and reproductive performances than Gugut ecotypes.

REFERENCES


