

# **The Paradox of Exotic versus Indigenous Chicken Population Dynamics and Distribution Pattern in Ethiopia: Review**

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## **Abstract**

Chicken in Ethiopia represents a significant part of the national economy and contributes to 98.5% and 99.2% of the national egg and chicken meat production, respectively. The total chicken population is estimated to be 56.87 million of which 95.86, 2.79 and 1.35% are indigenous, hybrid and exotic breeds, respectively. Therefore, the objective of this paper was to quantify the population dynamics and distribution patterns of exotic versus indigenous chicken population in the country. Different exotic chicken breeds have been introduced for upgrading of the potential of chicken ecotypes but, the survival, productivity and population size of either exotic or crossbred is too low. The production and reproductive traits of local chicken are characterized with small sized eggs, slow growth rate, late maturity, slow age at first mating, small clutch size, natural learning to broodiness and high mortality of chicks. To alleviate these, the Amhara regional state for example did massive introduction of exotic genotypes (Isa Brown, Bovans Brown and Koekoek) via distribution of fertile eggs, day-old chickens, crossbred pullets and exotic cockerels. However, the exotic chicken population size (206 200, 513705 and 17311216 exotic, hybrid and indigenous, respectively) and (the mean egg production /hen/year for Isa, Bovans and Koekoek was  $276.1 \pm 11.03$ ,  $266.32 \pm 8.7$  and  $187.04 \pm 13.49$ , respectively) is too low. This indeed is due to inappropriate production system, genotype and management. Therefore, selection of indigenous chicken ecotypes and crossbreeding or upgrading by introduction of cocks, pullets and or fertile eggs of high egg producing strains with appropriate production system and management in respective production system would increase production and productivity.

**Keywords:** Chicken, Genotypes, Population dynamics, Production system

## Introduction

In livestock production, Ethiopia is the first in Africa and the tenth in the world and plays important socio-economic roles for rural poor (Salam, 2005; Fisseha *et al.*, 2010). Of all the livestock species, chicken are widespread and important sources of incomes for rural family (Tadelle *et al.*, 2003; Fisseha *et al.*, 2010). Therefore, the total chicken population in the country was estimated about 53.3 million (CSA, 2011). Of which about 99% of these chicken populations are maintained under the traditional production systems. Rural poultry system is dominated by indigenous chickens (Alders and Pym, 2009) and well adapted to harsh environmental conditions (Ajayi, 2010). These indigenous chickens show a large variation in body position, feather distribution, plumage color, comb type, shank color, poor production and productivity. According to Tadelle *et al.*, (2003) and Halima *et al.* (2006), these variations of the indigenous chickens are due to their adaptive nature in different production environment (Gueye, 1998, Dana *et al.*, 2010). Therefore, in Ethiopian many works were made to improve village chicken production systems through introduction of exotic chickens (Alemu and Tadelle, 1997). Despite, this huge distribution of exotic chicken and its contribution to improve local chicken is very low (Teklewold *et al.*, 2006). However, about 53, 14.12 and 3.75 million chickens in the country, the region and North Gondar zone was reported (CSA, 2011). However, their productive and reproductive performance is very poor than exotic chickens.

To improve the performance of indigenous chickens identification and characterization of available genetic resource based on agro ecology is the most important methodology (FAO, 2011). However, the information on farmers' breeding practices, traits

preferences understanding of village chicken production and breeding system makes it difficult to design and implement poultry based development programme. Developing appropriate animal breeding programs for village conditions requires defining the production environments and identifying the breeding practices, production objectives and trait choices of rural farmers based on agro ecologies. Many researchers like Tadelle *et al.*, (2003); Halima (2007, Dana *et al.*, 2009 and Addis *et al.*, 2014 have made phenotypic and genetic characterization of indigenous chicken in some parts of the country, poultry production and marketing system in by Mekonnen (2007), characterization of poultry productivity and marketing system by Boggle (2008) and genetic parameters on Horro chickens by Dana *et al.*, (2010)

Similarly, the total chicken population of the Amhara region is estimated to be 18.0 million accounting to 2.9% of the National chicken population. Despite this the current production system like lack of knowledge on chicken husbandry (feeding, housing, health care, etc), lack of complimentary inputs (feed, alternative breeds, etc), lack of strong extension follow up, high disease prevalence and predation, unavailability of credit services and market are the limited factors (Hailemariam Teklewold *et al.*, 2006).

The Northwestern part of the region is also potential for chicken production more over much of the exotic breeds from Andassa and Kombolcha poultry Multiplication Center were distributed in the region. Distribution of pullets, cockerels, day-old chicken and fertile eggs, layers and duals breeds, has been one of the poultry extension packages accomplished by the Regional Office of Agriculture, since the last 20 years, aiming at improving chicken production and productivity.

Despite this huge distribution of exotic chicken breeds, the contribution (adoption rate) of improved chicken in the current production system of the region is believed to be very low mainly due to high mortality rate of chicks (Hailemariam Teklewold *et al.*, 2006). Therefore, the objective of this paper was to quantify the population dynamics and distribution patterns of Exotic versus indigenous chicken population in Amhara region, Ethiopia

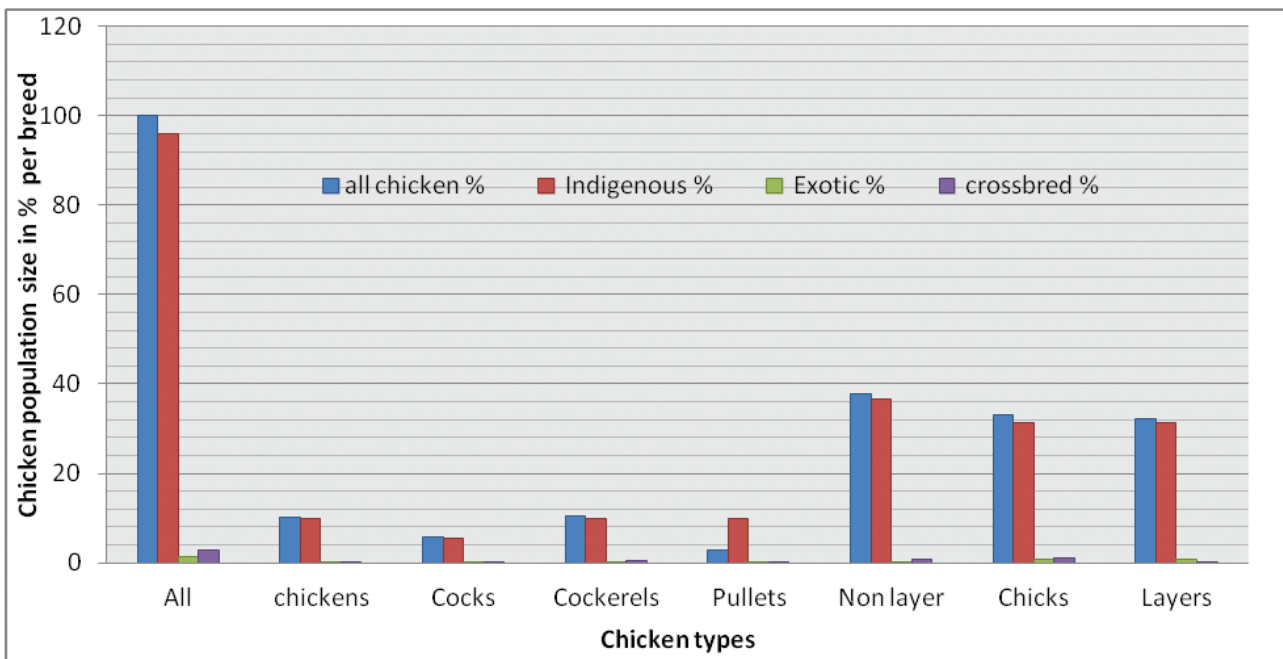
### The Paradox Exotic Versus Indigenous Chicken Population

Rural chicken in Ethiopia represents a significant part of the national economy in general and the rural economy in particular and contributes to 98.5% and 99.2% of the national egg and chicken meat production, respectively (Aberra Mellese, 2000). However, the economic contribution of the sector is still not proportional to the huge chicken numbers, attributed to the presence of many technical, organizational and institutional constraints. According to the (CSA, 2015/16) the total chicken population in Ethiopia is estimated to be 56.87 million of which 95.86, 2.79 and 1.35% are indigenous, hybrid and exotic breeds, respectively (Table 1 and Figure 1).

**Table 1.** Estimated numbers of chicken populations by type and breed in Ethiopia

Types of Chicken	All		Indigenous		Exotic		Crossbred	
	No.	%	No.	%	No.	%	No.	%
All	56,866,719	100	54,510,315	95.86	770,021	1.35	1,586,425	2.79
chickens	5,807,609	10.21	5,559,98	9.78	82,381	0.14	165,28	0.29
Cocks	3,214,333	5.65	3,087,98	5.43	18,698	0.03	107,67	0.19
Cockerels	5,914,054	10.4	5,591,19	9.83	128,12	0.23	194,83	0.34
Pullets	1,679,687	2.95	1,602,36	9.83	35,956	0.06	41,366	0.07
Non layer	21,429,389	37.68	20,899,5	36.75	41,705	0.07	488,49	0.86
Chicks	18,821,646	33.1	17,769,8	31.25	463,20	0.81	588,59	1.04
Layers	15,893,342	32.25	15,372,32	31.19	430,883	0.87	90,087	0.18

Source: CSA, 2015



**Figure 1.** Indigenous, exotic and crossbred chicken population size in Ethiopia

Among the different food sources, poultry products contribute significantly to the Ethiopia's food demand. With the increasing population of the country, there is an increasing demand for the supply of food. Under the prevailing management situations, it was difficult to fulfill these demands in expected time. Therefore, intensification and upgrading of the potential of Chicken ecotypes could be inevitable to provide surplus products. As a result, different exotic chicken breeds have been introduced into this country for a long period of time (Alemu Yami, 1995; Ashenafi, 2000; Tadelle Dessie and Ogle, 2001). but still the survival, productivity and population size of either exotic (1.35%) or crossbred (2.79%) is too low to consider (Table 1 and Figure 1).

#### Performance of Indigenous Chicken

The local chicken production and reproductive traits performance are varied and expressed as low production and reproductive performance, produce 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 (Bogale, 2008; Fisseha, 2009; Meseret, 2010 (Table 2).

#### Egg production

In Ethiopia, of the total, 99% of egg production is contributed by local chickens with an average annual output of 78000 metric tons (Tadelle *et al.*, 2003; Hailemariam *et al.*, 2006; Fisseha *et al.*, 2010). According to Kidane (1980) the production potential of indigenous chicken at Wolita agricultural development unit the average annual egg production was between 30-60 eggs under village free range production system. Asela livestock farm discovered that the average egg production of local birds was 34 eggs/hen/year, with an average egg weight of 38 g (Brannang and Pearson, 1990) and enhanced to 80-100 eggs on station with improved environmental management (Dana and Ogle, 2000). According to Bogale (2008) the average number of eggs incubated/hen was 13 from this on average 11 chicks were hatched. 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 (Table 2). 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. According to CSA (2011) the average length egg-laying period per hen is also determined in breeds and environmental management where estimated numbers of days were 21, 36 and 105 days for local, hybrid and exotic breeds, respectively.

#### Meat production

Poultry meat and egg production account for more than 28% of the total animal protein produced in world in 1997 (Bogale, 2008). In the near future, 2020, the proportional contribution of poultry meat is believed to be increased by 40% in the developing world (Delgado *et al.*, 1999). In Ethiopia, of the total, 99.2% meat productions are contributed by local chickens with an average annual output of 72,300 metric tons (Tadelle *et al.*, 2003; Hailemariam *et al.*, 2006; Fisseha *et al.*, 2010). Day old chickens of different populations of indigenous chicken measures live weight of 27.3 gm per chicken (Halima, 2007; Bogale, 2008). The adult live

body weight of the different populations of indigenous local chickens also reported 1411-1700g for male and 1011-1517g for females (Dena, 2011). Different reports from different researchers indicated that the meat production ability of indigenous chicken were limited as measured based on growth performance (Bogale, 2008) (Table 2). Local males may reach 1.5 kg live weight at 6 months of age and females about 30% less (Bogale, 2008). Teketel (1986) found that the local stocks reached 61 % and 85 % of the body weight of White leghorn (WLH) at 6 months of age maturity, respectively. Abebe, 1992 also found that the local chicken in Eastern Ethiopia attained 71.5 % of the body weight of White Leg Horn at 6 months of age. Solomon (2003) 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 700-1400gm. The amount and protein contents of chickens meat fall during the short rainy and dry seasons (Tadelle and Ogle, 2000) (Table 2).

**Table 2.** Production performance of indigenous chicken

Performance	Site	Authors
30 to 60 eggs/hen/yr	WADU	(Kidane, 1980)
34 eggs/hen/yr	Asella	(Brannang and Pearson, 1990)
18-57 eggs/year/ hen	Northwest Ethiopia	(Halima, 2007)
55.2 egg/hen/yr	Sothern Ethiopia	(Mekonnen, 2007)
36 eggs/3cluch/yr	Fogera	(Bogale, 2008)
24-3 chicks weaned/clutch	Fogera	(Bogale, 2008)
3.78 ± 0.07 clutch/yr	Bure	(Fissiha, 2009)
53-60 egg/hen/yr	Northwest Ethiopia	(Fisseha <i>et al.</i> , 2010)

### Exotic Chicken Breed Dissemination Trend in Amhara Region

Introduction of exotic breeds of chicken into different parts of Ethiopia have been conducted over the last five decades and the trend is increasing in almost all parts of the country. Such massive introduction of exotic genotypes was conducted via distribution of fertile eggs, day-old chickens, crossbred pullets and exotic cockerels. A number of governmental and non-governmental organizations were involved in this operation. To this end, about two poultry breeds multiplication centers were involved in the production and distribution of exotic and crossbred chickens for pure and crossbreeding purposes aimed at improving the genetic potential of the local breeds for egg and meat production (Table 3 and Figure 2). As a result, distribution of "best performing genotypes" is being implemented at an alarming rate and if this trend continues at the current pace, the gene pool of the local breeds could be lost in the near future before they are

even described (Haftu Kebede, 2015). However, neither the exotic chicken breed/crossbred increased in sizes nor the egg production in the areas distributed (Table 1 and Figure1).

Accordingly, the Bureau of the Amhara National Regional State of Agriculture and Rural Development (BoARD) schemed poultry development strategy starting from 2010. The main purpose of the strategy was to enable farmers to generate income through rearing day-old chickens of three exotic breeds, Bovans-Brown (BB), Koekoek and Bovans white breeds (BW) which were hatched and distributed from poultry multiplication centers located at Andassa, Kombolcha and Ethio-chick. During the periods of 2010 to 2015 over 32,134,426 (31,319,335 day-old chickens, 642378 two month pullets and cockerels and 172713 fertile eggs) were distributed to in the region. The mean Egg production/hen/year for Isa Brown, Bovans Brown and Koekoek was  $276.1 \pm 11.03$ ,  $266.32 \pm 8.7$  and  $187.04 \pm 13.49$ , respectively (Table 3 and Figure 2)

**Table 3.** Egg production, age at first egg and of exotic chickens at farmer level

Exotic chicken	Egg/hen/year (Mean±SD)	Age at first egg (month) (Mean±SD)
Isa Brown	276.1±11.03	5.35±13.5
Bovans Brown	266.32±8.7	5.52±13.2
Potchefstroom Koekoek	187.04±13.49	5.11±6

Source: Desalew Tadesse, 2012

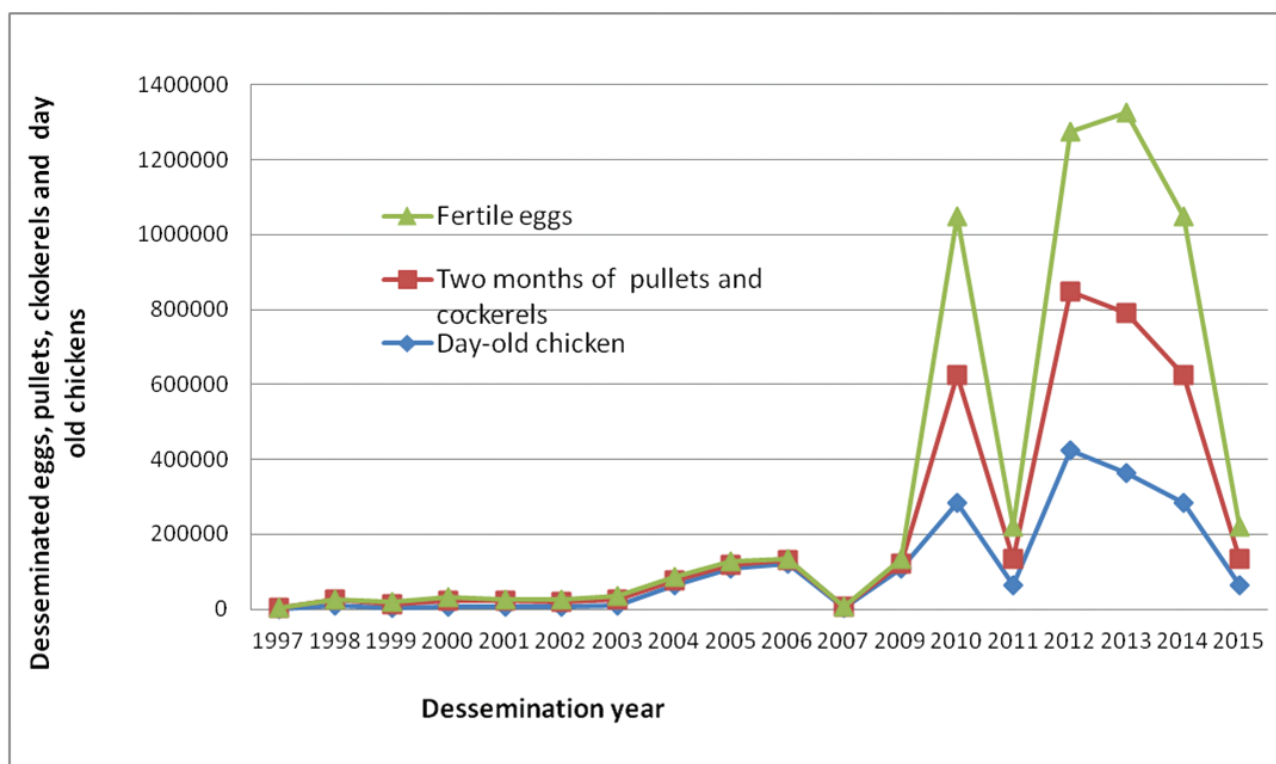


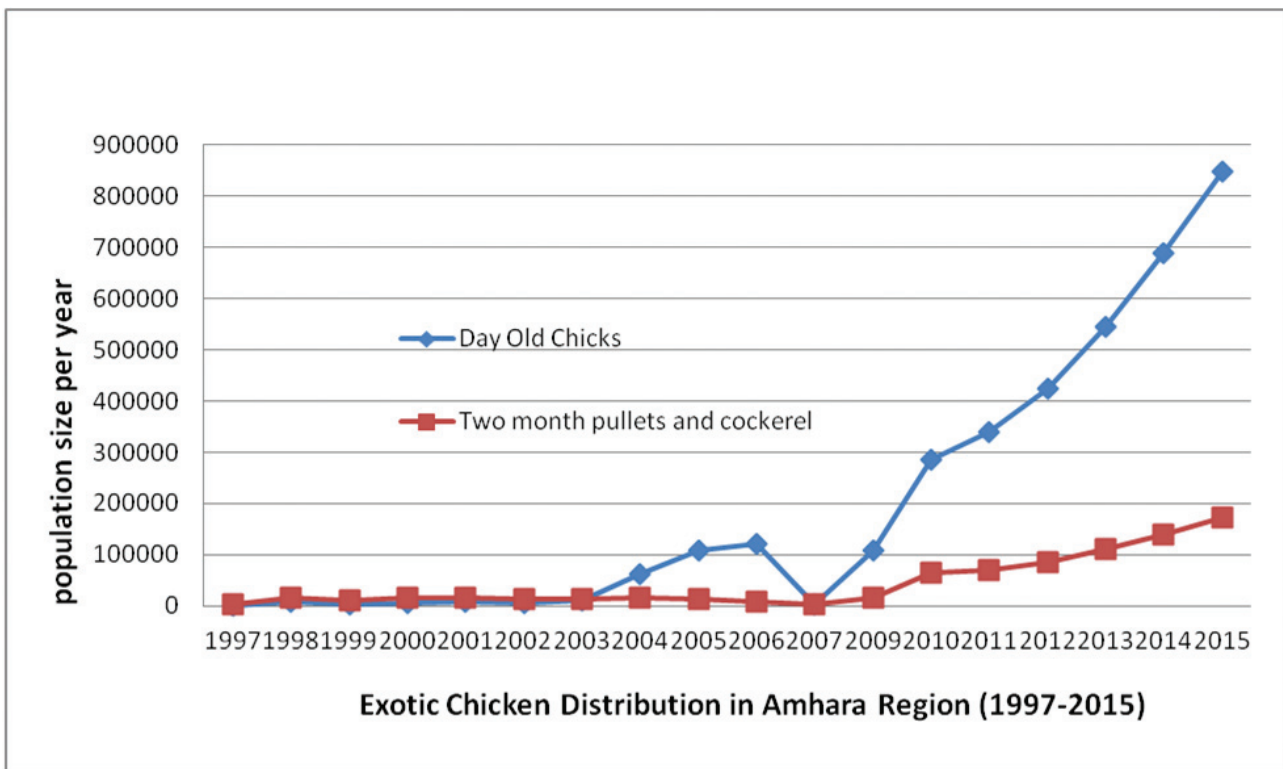
Figure 2. Trends of exotic chicken distribution in Amhara region

### Current Status of Exotic Chickens' Distribution in Amhara Region

As it has been mentioned earlier, the total chicken population in Ethiopia is estimated to be 56.87 million of which 95.86, 2.79 and 1.35% are indigenous, hybrid and exotic breeds, respectively. Similar to the national system; the major proportion of chicken production (98%) in Amhara region (ANRS) is a traditional sector, at small holder level, from which almost the whole annual meat and egg production is produced (ANRS-BoARD,2006). According to the (CSA, 2015/16); there were around 18 million chicken populations in Amhara region, accounting to 2.9% of the national chicken population. Despite this the current production system like lack of knowledge on chicken husbandry (feeding, housing, health care, etc), lack of complimentary inputs

(feed, alternative breeds, etc), lack of strong extension follow up, high disease prevalence and predation, unavailability of credit services and market are the limited factors ( Hailemariam Teklewold et al., 2006).

The Northwestern part of the region is also potential for chicken production more over much of the exotic breeds from Andassa, Kombolcha poultry Multiplication Center were distributed in this area. Distribution of pullets, cockerels, DOCs and fertile eggs, layers and duals breeds, has been one of the poultry extension packages accomplished by the Regional Office of Agriculture, since the last 20 years, aiming at improving chicken production and productivity. Despite this huge distribution of exotic chicken breeds, the contribution (adoption rate) of improved chicken in the current challenges and opportunities of the region is



**Figure 3.** Trends of exotic Chicken distribution in Amhara region( 1997-2015).

believed to be very low mainly due to high mortality rate of chicks (Hailemariam Teklewold *et al.*, 2006). The highest chicken population of the region (total chicken population of the region is 18,031,121 (206 200, 513705 and 17311216 exotic, hybrid and indigenous, respectively is found in Amhara region (CSA, 2015/16) (Figure 3).

### Perceptions of Farmers on Chickens Distribution and Management

The introduction of exotic conducted various times and indifferent forms, such as through the introduction of cockerels, pullets, and fertile eggs, but their impact in upgrading the village chicken has been minimal. Usually the farmers were given advice on improved feeding and housing and were asked to remove all remaining local cockerels. But throughout the length and breadth of the

country, success has not been achieved, mainly because chances are very high that the exotic bird will die, leaving the farmer with no cockerel at all. Some geneticists argue that it can lead to a loss in hatching ability in the flock and therefore it could result in the breakdown of the self-sustaining system of production at village level.

According to the Amhara Regional Agricultural Office, in Amhara Region attempts have been made at various times to improve local chicken production through introduction of exotic chicken breeds (Simegnew Tamir *et al.*, 2015). Distribution of pullets and cockerels has been one of the poultry extension packages accomplished by the Regional Agricultural Office for long periods. However, the method creates a challenge in addressing many areas in short period of time and this method of distribution failed to address the goal of the government as well as interested areas of the region. Thus, the Regional

Agricultural Office forced to search a new method of distribution to address wider area which is day old chicks (DOCs) distribution (Simegnw Tamir *et al.*, 2015).

Despite the huge effort to address wider area using day old chick's distribution, the method is highly criticized by smallholder poultry producers (Simegnw Tamir *et al.*, 2015). All (100 %) of the farmers do not like Day-old chick distribution and only 7.98% of distributed reach to young chickens (2 month age) at smallholder level due to poor facility before and after delivery as well as production systems (Simegnw Tamir *et al.*, 2015).

Chicks should be managing for 3 months at model poultry farms under similar management before distribution to smallholder farmers. Light duration should be 23 h in the first 5 days and decreased to 14 h at 5 weeks. During a 3-month, layer chick ration for 4 weeks, grower ration for 12 weeks and water should be provided under intensive management system. Village chicken vaccination particularly against Newcastle disease (ND) is more economically beneficial than the provision of daytime housing, supplementary feeding, cross breeding and control of broodiness (Udo *et al.*, 2001).

The source of these layers distributed for smallholder farmers in the region were from Andassa and Kombolcha poultry multiplication. Exotic chicks are carefully selected and specialized solely for the production of either meat or eggs, unsuitable for breeding purposes, especially for mixing with local village chicken and have very low mothering ability and broodiness (Sonaiya and Swan, 2004). Thus, supply of day-old chicks/pullet chain continues based on the interest of farmers every year to replace aged layers at village. The adaptation period helps the chick to grow at some level, in which able to scavenge their own feed at the village and

protect from predators. About 95% farmers in most rural environment provided maize and wheat as additional supplements three times a day. Similarly, water should provide as free access by more than 96% of the farmers in all part of the region. Thus, provision of supplementary feed and watering was similar along the region.

### **Hatchability and Mortality Rates of Exotic Chickens**

Hatchability and rate of chick survival are one of the major determinant factors of productivity in poultry. Tesfa Geleta *et al.*, (2013) indicated that egg produced from Fayoumi chickens under Oromia Agricultural Research Institute had lower hatchability (63.5%) compared to hatchability reported by Abraham Lemlem and Yayneshet Tesfay (2010), 67.9% for Fayoumi and 76.1% for White Leghorn but higher than for Rhode Island Red (39.3%) in northern Ethiopia. Kebede *et al.*, (2014) also reported eggs collected from White Leghorn under intensive management have higher (78.6-81.4%) hatchability.

Mortality rate of distributed exotic chickens at the age day-old in three agro-climatic zones of Amhara regional State was 45% (Hailu Mazengia *et al.*, 2012), 68% chick and pullet mortalities in Fayoumi and 48.5% in White Leghorn were observed in northern Ethiopia (Abraham and Yayneshet, 2010). Alamargot (1987) indicated the mortality of commercial chickens from egg to adult in Ethiopia is in the range of 20-50%. However, Tesfa Geleta *et al.*, (2013) mortality rate of Fayoumi chicken under Adami Tulu Research center (7.2%) is similar with the mortality rate (7.1%) reported by Kebede *et al.*, (2014) for white leghorn breed under intensive management condition and average mortality of exotic chickens was 7.8 chicken/year in lowland and 6.1 chicken/year in midland agro ecology, respectively

**Table 4.** Comparative productivity indicators of the traditional, breeding centers and Commercial poultry production systems in Ethiopia

Item	Traditional (indigenous)	At research farm (Andassa)	Breeding center	Commercial farms
Average egg weight (g)	38	56.73	56	56
Mean laying period/ hen (days)	20	230	240	210
Eggs/hen per year	60	197.40	200	230
Chick mortality (%)	40	7%	7.5	5.5
Fertility (%)	75	94	80	80
Hatchability (%)	70	85	65	90
Age at first egg (days)	180	149.67	150	145
Mortality of adult flock (%)	20-30	5-7	6-8	5-6

Source: (CACC, 2003), (FAO, 2007) and Halima Hassen *et al.*, (2007a)

(Alem Tadesse, 2014). Chickens mortality up to 8 weeks of age ranged from 4.3-5.3% for RIR and from 4.3-5.7% for Fayoumi in central Oromia (Reta Duguma *et al.*, (2012). Similarly, 29.9% exotic chick mortality reported by Hailu Mazengia and Eshetie (2008). Moreover, Hailu Mazengia *et al.*(2012) reported mortality rate of exotic chickens in low altitude districts (52.98%) was found higher than high altitude (48.88%) and mid-altitude (43.25%) districts. higher mortality rate of exotic chickens in low-and high altitude areas may be associated with extreme cold and hot temperature for newly distributed day-old chicks in these areas. The mortality rates of chickens in dry, rainy, before rainy and after rainy seasons were 47.35, 47.51, 44.90 and 43.66%, respectively (Hailu Mazengia *et al.*, 2012). Hailu Mazengia and Eshetie (2008) reported higher mortality rate in wet season than dry season in parent stock flocks of RIR

## Major Challenges and Opportunities

### Challenges

Under farmer management poultry production, prevailing disease, predators, market problem, lack of water, lack of proper health care, poor feeding and extension together with veterinary services were reported as the major constraint by Fessiha Moges *et al.*, (2010), Addis Getu and Malede Birhan (2014), Nigussie Dana and Ogle (1999) and Mengesha Mengistu *et al.*, (2011). NCD is highly infectious and causes more losses than any other diseases in the tropics and it spreads rapidly through the flock and mortality could reach up to 100% (Nigussie Dana *et al.*, 2003; Fessiha Moges *et al.*, 2010 and Mengesha Mengistu *et al.*, 2011).

Exotic chickens are poor scavengers as well as foragers and have low levels of disease tolerance, possess poor maternal qualities and are poor adapted to harsh conditions and good quality feeds as compared to the local breeds. Lack of knowledge about poultry production

systems and management (Ashenafi Hagos *et al.*, 2004) remains to be the major challenges in village based chicken productions.

The major causes of this problem as perceived by the community and in their order of importance were disease (63.8%), predation (21.8%), lack of feed (9.5%) and lack of information (4.9%), as per the reports of Tadelle Dessie (2003). Insufficient water was also one of the causes of mortality in chicks and older birds and a contributing factor to low productivity. The major constraints of distributed village exotic chicken production were partly due to poor management of the chicken (prevailing diseases and predators, lack of proper health care, poor feeding and lack of adaptation in local environment (Hunduma Dinka *et al.*, 2010).

#### *Opportunities*

The first critical step is the encouragement of farmers to change their attitude towards poultry keeping that includes introduction of regular watering and feeding, supplementation with quality feeds, cleaning the bird's night shelter and taking care of the young chicks. Such changes in the management of village chicken production system could discourage getting broody and bring about significant improvements in the productivity of local birds (Dwinger *et al.*, 2003).

In the village chickens, it is clear that one of the major problems to be solved will be the feeding as the system is mainly based on scavenging. Scavenging feed resources do not lead to an efficient village chicken production (Dwinger *et al.*, 2003).

The main opportunity to increase chicken production and productivity is selection of indigenous chicken ecotypes and crossbreeding or upgrading by introduction of cocks, pullets and /or fertile eggs of high

egg producing strains. Designing appropriate production system in respective urban, per-urban and rural areas would increase production and productivity. Improvements of the genetic potential of the local chicken have done through selection within and/or up grading with exotic breeds (exchange of cockerels from selected strain or breed could improve the performance of local chickens). The intention of this scheme was to enable farmers to handle pure breeds as well as crossbreed chicken.

Generally, the productivity of scavenging village chicken could be enhanced by relatively simple changes in management techniques (feeding, housing and health care) that promote improvement in productivity and reduction in mortality. A little technical support to farmers' experience or knowledge of supplementary feeding and watering would substantially improve productivity of local chicken. (Halima Hassen *et al.*, 2006).

#### **Conclusion and Recommendations**

From this review it was possible to conclude that though chicken production in the rural area to 98.5% and 99.2% of the national egg and chicken meat production, respectively, the production and productivity of chicken remains low. The government of Ethiopia designed to boost production and productivity through introduction of exotic breeds since 1997, still the population size of exotic genotypes remains under 5% as compared to the indigenous chicken ecotypes. On the other hand, the local chicken ecotypes with increased population size, the production and reproductive traits performance are varied and expressed as low production and reproductive performance, produce 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. The Amhara regional state also gave attention to the exotic chicken ecotypes and made massive introduction of exotic genotypes (via distribution of fertile eggs, day-old chickens, crossbred pullets and exotic cockerels (Isa Brown, Bovans Brown and Koekoek) and still the mean egg production, productivity and survival rate was very low. The major challenges revealed were poorly designed production system and management as per the urban, peri-urban and rural chicken production and indiscriminate introduction chicken genotypes which could not match with prevailing production system. These challenges could be overcome selection of indigenous chicken ecotypes and crossbreeding or upgrading by introduction of cocks, pullets and/or fertile eggs of high egg producing strains. Designing appropriate production system and management in respective urban, peri-urban and rural areas could help so as to increase production and productivity.

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