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Poultry Production, Consumption, Marketing and Associated Challengesin Ethiopia

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Abstract: This review on the production, consumption, marketing and challenges of poultry and its products in Ethiopia. Poultry is by far the largest group of livestock species in the world and chicken largely dominate flock composition. In Ethiopia except chickens other poultry species production is not practicing that they are living in their natural habitat. The poultry sector in Ethiopia can be characterized into three major production systems based on some selected parameters such as breed, flock size, housing, feed, health, technology and bio-security. These are large commercial, small scale commercial and village or back yard poultry production system. However, the majority of chicken production system in Ethiopia remains as village or back scavenging system which consist the indigenous chickens as major. In Ethiopia, poultry industry plays a significant role in the supply of human food (eggs and meat) in rural and urban area and as a source of income, especially to small holder farmers. About 95.86% of the total national poultry products (eggs and meat) are contributed by indigenous chickens kept under village management system while the remaining 1.35% is obtained from intensively kept exotic breed of chickens and 2.79% are obtained from hybrids. Poultry meat and eggs are relatively cheap and affordable sources of protein for most consumers, compared to other animal products such as beef. At the household level poultry is important to the nutritional well-being of household members especially children and as income source for women. However, the per capita poultry and poultry product consumption in Ethiopia is one of the lowest in the world: 57 eggs and 2.85 kg of chicken meat per annum. The marketing system of poultry and poultry products is generally informal and poorly developed. In summary, in Ethiopia the contribution of poultry production to the overall national economy and nutritional use is significantly lower than the rest of African countries attributed to prevailing disease, predators, poor feed, poor housing, low income level, religion, low productivity of local breeds, poor extension services, inadequate credit facilities, availability of few or limited research activities, lack of organized marketing and processing facilities and so forth challenges. Therefore training (on improved managements, feed formulations, formation of marketing associations and business management), production of additional and more economical poultry species over chicken, giving special emphasis on exotic chicken breed dissemination and management, avoiding the consumption behavior dependency of chicken products (meat and eggs) only on holidays and religious festivals and establishing a stable marketing chain are needed.

Key words: Poultry · Production · Consumption · Marketing · Challenges · Ethiopia

INTRODUCTION

Poultry is by far the largest group of livestock species [1], contributing about 30% of all animal protein consumed in the world [2]. The poultry sector is characterized by its industrialization, faster growth in consumption and trade than any other major agricultural sectors in the world [3]. Nearly all rural and peri-urban families in developing countries keep a small flock of free range chickens [4]. However, most rural communities lack the required husbandry skills, training and opportunity to effectively improve their chicken production [5]. Chickens largely dominate flock composition and make up about 98% of the total poultry numbers (chickens, ducks and turkeys) kept in Africa [6]. The rural chicken population accounts for more than 60% of the total national chicken population in most African countries. The majority of the flock consist indigenous chickens which are general

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hardy, adaptive to rural environments, survive on little inputs and adjust to fluctuations in feed availability [7]. Poultry production systems of tropical regions are mainly based on the scavenging indigenous chickens found in virtually all villages and households in rural area.It has been estimated that 80% of the poultry population in Africa is found in traditional scavenging systems [8].

Of all domestic animals in the Ethiopia, poultry is the most numerous and all of which are represented exclusively by chickens [9], because except chickens all other poultryare found in their natural habitat [10]. Thus the word poultry is synonymous with domestic chicken (*Gallus domesticus*) because other types of poultry are almost unknown as sources of egg and meat [11]. According toTadelle *et al.*in Ethiopia almost every rural family owns chickens, which provide a valuable source of family protein and income [12]. The total chicken population in the country is estimated to be 56.87 million [13]. The most dominant chicken types reared in Ethiopia are local ecotypes, which show a large variation in body position, plumage color, comb type and productivity [14-16]. However, the economic contribution of the sector is not still proportional to the huge chicken numbers, attributed to the presence of many productions, reproduction and infrastructural constraints [17].

The poultry sector in Ethiopia can be characterized into three major production systems based on some selected parameters such as breed, flock size, housing, feed, health, technology and bio-security. These are large commercial, small scale commercial and village or back yard poultry production system. These production systemshave their own specific chicken breeds, inputs and production properties. Each can sustainably coexist and contribute to solve the socio-economic problems of different target societies [12].

In most part of Ethiopia, village chicken represents a significant component of the rural household livelihoods as a source of cash income for immediate household expenses and nutrition. Production of both egg and chicken meat has certainly associated in reducing the gap in the supplies of animal protein for human consumption [18]. About 95.86% of the total national poultry products (eggs and meat) are contributed by indigenous chickens kept under village management system while the remaining 1.35% is obtained from intensively kept exotic breed of chickens and 2.79% are obtained from hybrids [13]. Cash income is the primary purpose of village chicken production. Poultry consumption is moreover closely associated with wealth status. The poorer the household, the fewer poultry products are eaten. Chickens are not a daily food even for a better-off household. Chickens are consumed mostlyduring holidays. In general, poultry consumption accounts for less than 1% of the total annual food needs of farm households [19]. Rural chicken in Ethiopia represents a significant part of the national economy in general and the rural economy in particular and contribute to 98.5% and 99.2% of the national egg and chicken meat production, respectively [15, 17]. All the available literature tends to indicate that the per capita poultry and poultry product consumption in Ethiopia is one of the lowest in the world: 57 eggs and 2.85 kg of chicken meat per annum [11]. 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 Gueye and Pedersenit is difficult to design and implement chicken-based development programs that benefit rural people without understanding village chicken production and marketing systems [20, 21]. Hellin, *et al*. alsoreported thatunderstanding of village chicken functioning and marketing structure are a prerequisite for developing market opportunities for rural households and could be used to inform policy makers and development workers in considering the commercial and institutional environment in which village chicken keepers have to operate [22]. According to Aklilu *et al.* studies on marketing of free range chicken can also provide clues for management strategies of chicken especially in reducing losses that smallholder farmers experience annually due to the threat of diseases [23]. Mlozi *et al.* also suggested that information obtained from analysis of village chicken production and marketing systems study is highly required to characterize, conserve and improve the indigenous chicken genetic resource and to justify resource allocation to rural poultry improvement and conservation projects [5].

In Ethiopia the contribution of poultry production to the overall national economy and nutritional use is significantly lower than the rest of African countries [24]. Therefore, a comprehensive review of the research results of chicken productions, consumption, marketing and challengesin countrywill enable the delivering of good information that will also be helpful for improved chicken utilization in the country.

Objectives:

- To review on poultryproduction system, poultry meat and egg consumption, marketing and associated challenges in Ethiopia.

Poultry Production Systems in Ethiopia: The poultry sector in Ethiopia can be characterized into three major production systems based on some selected parameters such as breed, flock size, housing, feeding, health, technology and bio-security. These are large scale commercial poultry production system, small-scale commercial poultry production system and village or backyard poultry production system [19]

Village or Back Yard Poultry Production System: In Ethiopia more than 95% of poultry population comprises indigenous birds, revealing that the poultry subsector is characterized by traditional small-scale household-level poultry [25, 16]. As in other African countries, traditional poultry (backyard orvillage-level poultry) in Ethiopia is characterized by having low feed input (primarily scavenging), lowveterinary services and no investment in housing and hence minimal level of biosecurity. This system does not involve investments beyond the cost of the foundation stock, a few handfuls of local grains and possibly simple night shades or night time housing in the family dwellings [25]. It is by natural incubation and brooding that chicks are hatched and raised in rural Ethiopia. A broody hen hatching, rearing and protecting few number of chicks (6-8) ceases egg laying during the entire incubation and brooding periods of 81 days [26]. As a result the performance of chickens under rural conditions remain generally poor as evidenced by highly pronounced broodiness, slow growth rates, small body size and low production of meat and eggs [27, 7].

The sources of replacement stocks are usually rough purchasing followed by household hatching and others. In this system birds are usually kept under free-range system and the major proportion of the feed is obtained through scavenging. There are high off-take rates especially during national holidays and occasionally high mortality rates [28, 29]. Women are the primary owners and managers of chickens in the traditional poultry production sector. Rural women raises poultry for income generation aimed at purchasing of basic commodities such as salt, cooking oil, sugars etc. [30].

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 [6].

Small-scale commercial poultry production system: The small scale intensive poultry is newly emerging system in urban and peri-urban areas, where either broilers or egg type exotic breeds of chickens (50-1000) 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 DebreZiet. 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 and broilers to various supermarkets, kiosks and hotels through middlemen [31].

The small-scale intensive production system is characterized by medium level of feed, water and veterinary service inputs and minimal to low bio-security [32]. Small scale flock sizes usually ranging from 50 to 500 exotic breeds kept for operating on a more commercial basis are common in the urban and per-urban areas of Addis Ababa [33]. Reliable economic data concerning the value of commercial poultry products sold in any one year is not available. The general indications are that they supply meat to urban and per-urban population, particularly to supermarkets, kiosks and hotels. Some of the small scale modern poultry producers, along with Bureau of Agriculture, Cooperatives and DebreZeit Agricultural Research Center distribute breeding seeds and promote improved poultry and feeding technologies [32].

Large-Scale Commercial Poultry Production Systems: The large-scale commercial production system is highly intensive production system involves an average of greater or equal to 10, 000 birds kept under indoor conditions with a medium to high bio-security level. This system heavily depends on imported exotic breeds that require intensive inputs such as feed, housing, health and modern management systems. It is estimated that this sector accounts for nearly 2% of the national poultry population. This system is characterized by higher level of productivity where poultry production is entirely market oriented to meet the large poultry demand in major cities. The existence of somehow better biosecurity practices has reduced chick mortality rates to merely 5% [19].

The large scale commercial poultry provide fertile eggs, table eggs, day old chicks, broiler meat and adult breeding stocks to the small scale modern poultry farms. They are kept as full time business and highly dependent on market for inputs. The general indications are that the intensive poultry industry plays a key role in supplying poultry meat and eggs to urban markets at a competitive price. The industry also provides employment for a range of workers from poultry attendants to truck drivers to professional manager [34].

There are few private large scale commercial poultry farms, all of which are located in DebreZeit. ELFORA, Alema and Genesis are the top 3 largest commercial poultry farms with modern production and processing facilities. ELFORA annually delivers (www.ethiomarket.comelfora), around 420, 000 chickens and over 34 million eggs to the market of Addis Ababa. Alema poultry farms is the 2nd largest commercial poultry farms in the country delivering nearly half a million broilers to Addis Ababa market each year. The farm has its own broilers parent stock, feed processing plants, hatchery, slaughter houses, cold storage and transportation facilities [19].

According toGetinet most of the supply of poultry products to the Addis Ababa market is in the form of local eggs and chicken sold in several market places and street corners as well as door-to-door by individual traders [34]. Commercial chicken (broilers) and eggs are supplied at farm gates and through the various outlet shops of ELFORA, Alema, Almaz and Tsedey poultry farms; while commercially organized suppliers of table eggs competing for the market are ELFORA, Kalehiwot, Genesis and NACID. These Commercial suppliers have fairly established production and distribution facilities.Solomon also noted that the larger commercial poultry units have agreements with clients such as Ethiopian Airlines for using in the plane during transportation and the larger hotels to supply poultry meat and eggs [26]. Most poultry meat is sold frozen. The majority of the products sold within the formal sector come from the commercial industry but a small number of frozen indigenous chickens are supplied through supermarkets in Addis Ababa.

Poultry Meat and Egg Consumption in Ethiopia: The contribution of village chicken production to household consumption in the form of meat and eggs especially by urban dwellers and relatively better off rural households is commendable. Chicken meat and eggs because of relatively low cost are preferred to be consumed at home especially during national festivals. Though there has been scarcity of information their contribution to the nutritional wellbeing of children could be large [35].

Poultry meat and eggs are relatively cheap and affordable sources of protein for most consumers, compared to other animal products such as beef. Consumption of poultry products is more common in urban areas than in rural areas. Poultry consumption is commonly high during holiday periods. The national poultry meat and eggs consumption is estimated, on an average, to be 77, 000 and 69, 000 tons per annum, respectively [36]. In the mid 1990s, the per capita egg and poultry meat consumption in Ethiopia was estimated at 57 eggs and about 2.85 kg, respectively [24]. However, this figure has been declining in the face of population growth in the country (Table 1).

The per capita consumption was about 2.85 kg of chicken meat per annum in Ethiopia, which are very low figures by international standards. Although there are no current data on the present per capita consumption of poultry products, a similar or even declining trend is probable because the population of Ethiopia has increased by about 3% per annum over the last ten years without any marked increase in the production of poultry meat. Innovative ideas and programs are therefore required to promote rural poultry production for the improvement of rural household incomes and nutrition [38]

According toFAOthere is a strong positive relationship between the level of income and the consumption of animal proteins [39]. Daghirreported thatthe current growth of poultry production and consumption makes a good case for the need and desire for future growth of the poultry industry [40]. Davealso reported that poultry consumption is expected to grow at 2 to 3% per year [41].

According toDavid, chicken meat is the best source of quality protein for those who are under-nutrition in sub-Saharan Africa (SSA) and South Asia [42]. Muchenje *et al.* reported that poultry provide major opportunities for increased protein production and incomes for smallholder farmers [43]. Abedullah and Bukhshnoted that the major contribution of poultry consumption in improving per capita nutrients level is well documented [44]. FAO reported that the human population benefits greatly from poultry meat and eggs, which provide food containing high-quality protein and a low level of fat with a desirable fatty acid profiles [45]. Arrey reported also that the possibility of village poultry as a viable sector to boost protein deficiencies [46].

According to Ovesen, *et al*.,[47], as compared with some food substitutes, poultry meat is distinguished for its low energy concentration and, consequently, it has high nutrient density (Table 2). Poultry meat, as well as other meat, is a good source of high biological value protein (20-22%). Furthermore, it provides iron and zinc of high bioavailability in lower quantities than red meats, but important amounts compared with food of vegetable origin. Poultry meat has significant content of vitamins from group B such as thiamin, riboflavin, niacin and vitamin B6, although vitamin B12 content is less than in other meats. The quantity of vitamin E, pantothenic acid,

Table 1: Estimated poultry meat and egg consumption kg/per capita of Ethiopia in 2010

	Rural	Urban	National
Poultry meat (kg)	0.08	0.16	0.12
Eggs (kg)	-	-	0.14
Population growth (%)	2.5 (85 in rural)	5 (16 in urban)	3

Source: [37]

Table 2: Nutritive value of poultry meat, per 100g of edible portion

	Whole	Breast	Vitamins	Whole	Breast
Water (g)	70.3	75.4	Vitamin B_1 (mg)	0.1	0.1
Energy (kcal)	167	112	Vitamin B_2 (mg)	0.15	0.15
Protein (g)	20.0	21.8	Niacin eq. (mg)	10.4	14
Total fat (g)	9.7	2.8	Vitamin B_6 (mg)	0.3	0.42
SFA(g)	2.6	0.76	Biotin (µg)	2.0	2.0
MUFA(g)	4.4	1.3	Folic acid (µg)	10	12
PUFA(g)	1.8	0.52	Vitamin B_{12} (µg)	0.4	0.4
PUFA/SFA	0.69	0.69	Vitamin C (mg)	-	-
Cholesterol (g)	110	69	Vitamin. A:Eq.Retinol (µg)	9	16
Minerals			Vitamin D (µg)	0.2	0.2
Calcium (mg)	13	14	Vitamin E (mg)	0.2	0.29
Iron (mg)	1.1	1.0	Vitamin K (µg)	-	-
Iodine (µg)	0.4	0.4			
Magnesium (mg)	22	23			
Zink (mg)	1	0.7			
Selenium (µg)	6	7			
Sodium (mg)	64	81			
Potassium (mg)	248	320			
Phosphorus (mg)	147	173			

Source: [48]

folic and biotin of poultry meat is considerably low. Recent analyses have determined that in addition to vitamin D, the 25-hydroxycholecalciferol metabolite (5 times more activity than calciferol) is present in meat. The quantity of fat in poultry meat differs according to the edible portion: 2.8 g/100 g breast, 10 g/100g whole carcass, 13 g/100g thigh with skin and 70 g/100 g skin. Significantly, poultry meat has a low total fat quantity and, more importantly a higher monounsaturated and polyunsaturated fatty acid (MUFA and PUFA) content than other meats. Nutritional recommendations include the reduction of total fat, saturated fat and cholesterol consumption in order to prevent the incidence of most common chronic disorders.

Of all the meat constituents, the lipid fraction has the highest susceptibility to modification, in contrast to protein with amino acidic composition determined by the genetic code. Different studies have focused on the use of dietary strategies to improve the quality of the poultry carcass and meat. One of the objectives of this modification is to increase the amount of unsaturated FA, especially the omega 3 (n3) families which has beneficial effects on human health. Nevertheless, as will be explained, increasing the unsaturation degree of the meat leads to organoleptic and nutritional problems and requires assessment of the oxidation processes of the lipid fraction. Thus, the relation vitamin E/PUFA of the poultry meat must be taken into account [47].

The table egg is the most nutritious, unsaturated, yet relatively inexpensive natural food, with a high digestibility coefficient. Egg protein is the best protein available in for human consumption, with a well-balanced amino acid profile, having the highest biological value, protein efficiency ratio, net protein utilization, net protein value and chemical score. As well as high protein quality, it is rich in all essential amino acids, fatty acids, minerals and vitamins; except vitamin C (Table 3). Even though the chicken egg is nutritionally superior, its cost is relatively cheaper, due to low cost egg production technology. Hence, the egg is within reach of poor people, even in developing countries and available in abundance everywhere. An egg is cheaper than a cup of coffee, tea, alcohol or soft drink; yet far superior to them nutritionally [49].

Poultry and Egg Marketing Systems in Ethiopia: The marketing system is generally informal and poorly developed. Unlike eggs and meat from commercial hybrid

Table 3: Nutrient components in 100g of poultry egg

Components	Quantity	Component	Quantity
Albumen protein		Phospholipids	
Ovalbumin	3.78g	Phosphotidylcholine (lecithin)	2.47g
Conalbumin(Ovotransferrin)	0.91g	Phosphotidyl ethanolamine	0.48g
Ovomucid	0.77g	Phosphotidyl serine	102mg
G2 & G3 globulin	0.64g	Lysophosphotidyl choline	226mg
Lysozyme (G1-globulin)	0.26g	Sphingomylin	38mg
Ovomucin	0.203g	Plasmalogen	34mg
Ovoflavoprotein	60mg	Lysophosphotidyl ethanol amine	78mg
Ovoglycoprotein	50mg	Isositol phospholipids	20mg
Ovomacroglobulin	40mg	Yolk sterols	
Ovoinhibitor	20mg	Cholesterol	0.40g
Avidin	4mg	Brassiscasterol	4.8mg
Crystatin	3mg	Campesterol	4.8mg
Yolk proteins		Stigmasterol	0.8mg
Ovovitellin	4.2g	B-sitosterol	0.8mg
Lipovitellin	0.5g	Glycolipids	38mg
Livetin	0.4g	Yolk pigment	
Low density lipoprotein	0.4g	Carotenes	1 to 2 mg
Ovolivetin	0.30g	Cryptoxanthin	0.2 to 0.60mg
Phosvitin	30mg	Lutein, astaxanthin, zeaxanthin& other	0.6 to 4.50mg
Vitellogenin	10mg	Xanthophylls	(Depends on hen feed)
Yolk lipids		Special components	
Triglycerides	7.30g	Taurine	5-8mg
Total saturated F.A.	3.55g	Sulforaphane	1-4mg
Total MUFA	4.55g	Lumiflavin	0.25mg
Total PUFA	1.31g	Lumichrome	0.20mg
Fat soluble vitamins	4mg	Sialic acid	10mg
		Betaine	90mg

Source:[49]

birds (derived from imported stock), local consumers generally prefer those from indigenous stocks. The existence of a local market offering good sales opportunities and adequate transport facilities are obvious prerequisites for family poultry development. As most consumers with greater purchasing power live in and around cities, intensification of poultry production should be initiated in peri-urban areas or, at least, in areas having a good road network [50]. According to Gausi *et al.* small holder village chicken producers tend to ignore new technology even when it appears to be better than their current practices due to market limitations. This implies that apart from meeting subsistence needs, engagement and level of investment of smallholder farmers in agricultural enterprises responds to existing market opportunities [51].

It is difficult to design and implement chicken-based development programs that benefit rural people without understanding village chicken production and marketing systems [21]. The informal marketing of poultry and poultry products at open markets is common throughout the country and both live birds and eggs are sold on roadsides [52]. Almost every little shop or kiosk sells table eggs in Ethiopia. Most indigenous birds are sold live and consumers take considerable care to ensure that they are buying healthy birds [35]. The birds usually sold from the village flock are surplus males (cockerels and cocks); pullets and non-productive hens; large sized birds; old hens and sick birds. Growing chicken are sold just before the onset of the high risk Newcastle Disease [53].

In most part of Ethiopia, the price, demand and supply of chicken are highly related to religious festivals, mainly Christian festivals. The egg marketing channel is more or less similar to that of chicken. Eggs are sold at the farm gate to egg collectors, in the open markets to middlemen and consumers and to retail shops, hotels and supermarkets in towns. Eggs pass through a relatively longer chain to reach the consumers than chicken. The main actors in egg marketing are producers, collectors, traders or (wholesalers), local kiosk, shops and supermarkets. Urban markets followed by nearest local market and farm gate are, in order of importance, the preferred outlets for egg marketing by producers [54]. Similarly, backyard poultry owners were selling their birds

at their own doorstep, to village market, after specific weight gain, to local shopkeeper and middleman in Bhandara district of India [55]. Indigenous birds and eggs can be transported over long distances to supply urban markets which may results in deteriorationin quality. Both eggs and live birds are transported either on foot or using public transportation. The farmers directly sell their chickens to consumers and/or to small retail traders who take them to large urban centers. In the primary markets, producers are the predominant sellers, while in the secondary markets both producers and traders sell chickens. In the terminal markets, small traders are the predominant sellers. Small traders operate on a very small scale and the volume of trade ranges from 10-50 chickens. The prices of chickens are determined on the size, sex, plumage, comb type, market location, demand and type of retailers [35].

Formal marketing operations exist in the urban and peri-urban areas where small scale market oriented poultry production takes place. Most of the producers do have agreements with clients such as supermarkets, restaurants, kiosks and shops. In few cases they do have their own marketing shops. Dressed poultry carcasses in the case of broiler producers and table eggs are sold to supermarkets, restaurants/ hotels, small shops and kiosks and few cases to consumers on national holidays. Even though reliable economic data concerning the value of commercial poultry products sold in any one year is not available, the intensive poultry industry plays a key role in supplying poultry meat and eggs to urban markets at large and marketing for the eggs and the meat have a stable market through-out the year [35].

The premium for local birds is attributed to better meatflavor and more deeply colored egg yolks [56]. An egg from local chicken is considerably smaller than commercial layers, usually weighing 50 to 66 percent [57]. Major challenges of poultry production, consumption and marketing in Ethiopia.

Challenges of Poultry Production in Ethiopia: The high mortality of chicks under village chicken production in Ethiopia is due to diseases, parasites, predation, lack of feed, poor housing and insufficient water supply [58]. Among the infectious diseases, Newcastle disease, salmonellosis, coccidiosis and fowl pox are considered the most important causes of mortality in local chicken while predators are an additional causes of loss [59].According to AdaneNewcastle disease (ND), Infectious Bursal disease (IBD) or Gumboro, Mareks disease (MD), Fowl typhoid, Cholera, Mycoplasmosis and Coccidiosis are major diseases that have been predominantly identified in different commercial poultry and small scale intensive poultry farms in Ethiopia [60]. These persuaded the small scale intensive producers to sell the chicken with the lowest price at the beginning of rainy season and purchase chickens with highest prices during the dry seasons. To this effect abundant number of chickens were observed during rainy season favoring the consumers and scarcity of chicken number and their products during the dry season.Yilmareported that health measures at the government owned poultry breeding and multiplication centers were extremely poor [61]. The basic hygienic practices are often disregarded and husbandry know-how are generally lacking. Foot-bath application, if at all it is practiced, was only when people enter the poultry houses but not when they leave poultry houses.Abebealso reported that almost all the breeding and multiplication centers were devastated by the outbreak of Infectious Bursal Disease i.e. Gumboro disease [62]. The health status in many of the small scale intensive poultry farms is extremely poor.

Limitation of feed resources, in terms of both quantity and quality, is the other major constraints affecting production and productivity of livestock including village chicken [63]. There is no purposeful feeding of chickens under the village conditions in Ethiopia and scavenging is almost the only source of diet. Scavenging feed resource base for local birds are inadequate and variable depending on season [64, 24]. According toEmebet *et al*. [35] in the case of small holder market oriented producers, constraints associated with inputs such as availability of feeds, day old chicks, veterinary inputs and market for the produce pose gloomy and uncertain future for the sector. According to Tegene, Tadelleand OgleandAlemuand Tadele crop analysis result indicated that the physical proportion of seeds was higher in the short rainy season and the concentration of crude protein; calcium and phosphorus were below the recommended requirements for meat and egg production [65, 66, 24]. 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 and meat production [66]. The quality of mixed feed for commercial poultry production is generally poor in Ethiopia. Most formulations available do not have vitamin/mineral premixes. Ingredients and processed feeds vary in nutritive value and there is no regular quality control mechanism in the country [67]. Similarly, unavailability of feed quality legislation and laboratory facilities for chemical analysis also contributes greatly to

the poor quality of processed feeds. Currently, understanding the problem the Ethiopian Quality and Standards Authority is working with the Ethiopian Society of Animal Production (ESAP) on feed quality standards and legislation [10, 68, 69, 70]. The shortage in the supply of protein supplements of animal origin has made the price of abattoir by-products extremely high. In many instances, the cost of mixed feed does not seem to follow reductions in ingredient cost. Prices of mixed feed remains unduly high even at times when the price of the major component of mixed rations (e.g. corn) fall by more than fifty percentage [10, 68, 69].

In addition to the above mentioned constraints, other vital problems affecting the productivity of village chicken including: low productivity of local breeds (attributed to low genetic potential, disease and poor chicken management practices), poor extension services and inadequate credit facilities, availability of few or limited research activities and lack of organized marketing and processing facilities [71]. Institutional and socio-economic constraints remains to be the major challenges in village based chicken productions [16, 28, 72, 73].

Challenges of Poultry Meat and Egg Consumption in Ethiopia: Some religion followers especially Ethiopian Orthodox Tewahedo Christians, abstain from eating meat and other animal products to attain forgiveness of sins committed during the year and undergo a rigorous schedule of prayers and atonement. Therefore, followers do not eat meat and animal products(i.e. egg, butter, milk and cheese) on fasting days such as Wednesdays and Fridays except the 50 days running from Easter, the Fast of the Prophets, the fast of Nineveh, Lent, the Fast of the Apostles and the fast of the Holy Virgin Mary [74]. The Ethiopian Orthodox Christians follow fasts with a frequency of approximately 250 days in a year [75].

Unequal distribution of income growth and non-uniformity of rate of urbanization in different parts of the developing countries. For example, the projection byAlexandratossuggested that the poor developing countries will remain dependent more on cereals and less on livestock consumption for daily energy in the future [76]. Ethiopian per capita meat consumption and its response to income change has distinct pattern between urban and rural households. More than 40% of meat in the country is consumed in urban areas. Per capita meat consumption in urban households changes more steeply with change in per capita income compared with rural households. Per capita meat consumption in Ethiopia is significantly affected by urbanization and level of income than meat price and cereal production [77].

According to Moges *et al.* and Dinka*et al.* and Mengesha *et al.* under poultry production, prevailing diseases, predators and poor feeding were reported as constraint highly affects production and consumption [78, 79, 80]. Alemu and Tadeleand Hoylereported scavenging feed resource base for local birds are inadequate and variable depending on season which affects production as well as consumption of poultry products [24, 64]. According toNegussieand Ogle, losses attributed to Newcastle disease is estimated at about 57.3% of the overall annual chicken mortality whereas fowl pox, coccidiocis and predation accounts for about 31.6, 9.4 and 1.7% of the total annual flock mortality, respectively [81].

Challenges of Poultry and Egg Marketing in Ethiopia: Market access was low with increased distance to the market for poorer households [23]. Marketing aspects of the smallholder poultry production often marginalized by policy-makers and development workers. Traditional chicken and egg collectors, who collect eggs and birds from the villages, can facilitate the marketing of small holders. However, such marketing structure are over looked, or criticized, as it is not sustainable and need to correct [82]. Even though chicken meat is relatively cheap and affordable source of animal protein [24], lack of organized marketing system and the seasonal fluctuation of price are the main constraints of the poultry market in Ethiopia [83, 84]. Singh also reported that lack of organized marketing is one of major constraints of chicken and egg marketing [71]. According toESAP [85] the major market constraints as identified by traders were lack of market place, poultry diseases, absence market information and lack of training on improved trading practice and marketing management). According to Fisseha *et al*. [86] the marketing of chicken and egg in Ethiopia isconstrained by poor management, low supply (output) due to disease and predation, seasonal fluctuation in prices, presence of only few/limited market outlets, lack of price information, lack of space in urban markets, lack of credits and capital to expand production and marketing activities.

CONCLUSION

Poultry is by far the largest group of livestock species but chicken dominates flock composition in the world. However, the vast majority of chicken flock consists of indigenous chickens which are general hardy, adaptive to rural environments, survive on little inputs and adjust to fluctuations in feed availability. It has been estimated that

80% of the poultry population in Africa is found in traditional scavenging systems. In Ethiopia also poultry is the most numerous and all of which are represented exclusively by chickens, because except chickens all other poultry are found in their natural habitat. Almost every rural family in Ethiopia owns chickens, which provide a valuable source of family protein and income. The most dominant chicken types reared in Ethiopia are local ecotypes, which show a large variation in body position, plumage color, comb type and productivity. The poultry sector in Ethiopia can be characterized into three major production systems based on some selected parameters such as breed, flock size, housing, feed, health, technology and bio-security. These are large commercial, small scale commercial and village or back yard poultry production system. About 95.86% of the total national poultry products (eggs and meat) are contributed by indigenous chickens kept under village management system while the remaining 1.35% is obtained from intensively kept exotic breed of chickens and 2.79% are obtained from hybrids. Poultry meat and eggs provide food containing high-quality protein and a low level of fat with a desirable fatty acid profiles as compared to other animal products such as beef and most consumers prefer to consume. Per capita poultry and poultry product consumption in Ethiopia is one of the lowest in the world: 2.85 kg meat and 57 eggs of chicken per annum attributed to inter-related factors; such as disease, feed shortage, poor management, low level of income, religion, low income level, poor marketing and processing facilities and so on constraints.

From this review the following recommendations are suggested:

- In case of traditional production system, producers need to be trained intensively on improvement of poultry managements.
- In case of small scale and large scale market oriented poultry production system, it is important to assist producersthrough training in the areas of feed formulations, formation of marketing associations and business management.
- To meet the demands of poultry meat and egg consumption in the country, production ofadditional and more economical poultry species over chicken is betterespecially in large scale commercial basis and special emphasize should be also given to exotic breed chickendissemination with successive awareness on improved management and health care. And, the consumption behavior of chicken meat and egg also should not be depended only on holidays and religious festivals.
- Provision of credit facilities, formation of both input supplier and marketing groups and establishing a stable marketing chain is important so that produces could obtain premium price for their products and will encourage the producers and contribute to the improvement of the sector.

Abbreviations:

EARO = Ethiopian Agricultural Research Organization,
ESAP = Ethiopian Society of Animal Production,
FRP = Farmers Research Project,
IBD = Infectious Bursal disease,
ILRI = International Livestock Research Institute,
MD = Mareks disease,
MUFA = Mono Unsaturated Fatty Acid,
ND = Newcastle disease,
PSPK = Partnership for Safe Poultry in Kenya,
PUFA = Poly Unsaturated Fatty Acid,
SNNPR = Southern Nation, Nationalities and Peoples Region

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