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Management Prospects and Challenges of Small-scale Commercial Poultry Production in Arsi and East-Showa Zones, Ethiopia: A Review

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ABSTRACT

Poultry farming primarily targets production of eggs and meat from indigenous or improved chickens. To enhance production of such products, it is indispensable to analyze production practices, identify constraints and take appropriate interventions. The study was conducted to assess management practices and constraints of small-scale commercial poultry farming. The data was collected using semi-structured questionnaire comprising lists of constraints from 132-layer, 56-pulletand 33-broiler producing farms through interviews with farm managers. The farm managers were asked to rank constraints and then the data was analyzed using Garrett ranking and index ranking techniques. Most farms were established as sole-proprietorship (55.2%), small-and-medium-scale enterprises (37.1%) and cooperatives (7.7%). The mean flock sizes of layer, broiler and pullet farms were 790, 1153and 953 chickens, respectively. The top five constraints of commercial poultry farms were high feed cost, diseases, feed shortage, finance shortageand high chicken cost. Additionally, poor technical skill, market, infrastructure, service qualityand biosecurity scheme and lack of chicken supply were among the limiting factors. Target-full participatory interventions by actors through extension of knowledge and technology to the grass-root level is of paramount importance to address the constraints and ensure productivity.

Key words: Chickens farms, Constraints, Management practices.

In Ethiopia agriculture (crops, livestock, fisheriesand natural resources) accounts for around 33% of Ethiopian GDP, 66% of employmentand 76% of exports (ATI, 2022). Such GDP share was higher than Sub-Saharan Africa which had 24% to GDP share. Livestock accounts for 19-25% of national GDP, 40-45% agricultural GDP, 16-20% foreign exchange and 30% of agricultural labor forces (Behnke, 2010; FAO, 2017). Poultry industry is one of the growing sub-sector in Ethiopia with a population size of 57 million chickens, of which 78.85% was indigenous, 12.03% hybrid and 9.11% exotic breeds (CSA, 2021). Chickens has an important economic and nutritional values as they are sources of quality protein (Laenoi and Buranawit, 2022). Village poultry production system is the dominant farming, characterized by traditional husbandry practices, low productivity and poor biosecurity. Small-scale commercial poultry production is a newly emerging production practices in Ethiopia having a flock size of 200-1000 improved chickens with moderate to intensive husbandry practices. The last one is large-scale commercial production system which implemented modern husbandry practices, owing large flock size>1000 chickens and performing at better productivity (Gezahegn, 2005).

Small-scale commercial poultry production in Ethiopia has got due emphasis in order for income generation, food and nutritional securityand source of employment with lower investment cost. However, such small-scale commercial production is hampered by highly interwoven multi-dimensional constraints. The challenges start from entrepreneurial attitude and spread throughout the production value chains. Some of the challenges are cultural,economic, technical, technological and institutional, though their influence were variable. The current study aims to investigate, identify and prioritize constraints of small-scale commercial poultry production across the entire production value chains.

The study was conducted for 18 months in 2022-2023 including farm identification, selection, supervisionand data collection through interview and FGD. Six districts were selected from Arsi and East-Showa zones of Oromia region, Ethiopia as indicated in Fig 1. The study districts were Tiyo, Hetosa and Dodata from Arsi zone; and Adama, Bishoftu and Boset from East-Showa zone, selected based on districts' chicken production potential, proximity to

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market and accessibility. A sample of 221 commercial-poultry farms having flock size above 100 chickens were selected in this study. Specifically, 132-layer, 56-pulletand 33-broiler farms were visited, supervised and characterized to obtain the required data. Among these farms 122 farms were individual-owned and 99 farms were group-owned farms.

Method of data collection

Cross-sectional research design was used to collect data with a scheduled interview using semi-structured questionnaire that comprises lists of constraints. The interview was scheduled with farm managersand asked them to rank constraints and describe their farms. Similarly, 6 FGDs were arranged with farm managers one in each study districts in order to investigate the common poultry production constraints and prioritize them using a checklist. The data was analyzed using descriptive statistics like percentages, frequencyand means using SPSS version-26. Graphs and ranking index were also used to present results. The constraints were prioritized using Garett's and index ranking techniques (Kosgey, 2004). The tools were employed to analyze the constraints perceived by the farmers and gives top priority challenges in the sector. According to the procedure of Garrett's ranking, percent position was computed first and then translated into scores using Table provided by (Garrett and Woodworth, 1969). The scores of individual respondents for each component were then put together and divided by the total number of respondents for whom scores were added.

$$\text{Per cent position} = \frac{100\ (R_{ij} - 0.50)}{N_j}$$

Where:

R_{ij}- Rank given for ith factor by the jth individual.

Nj- Number of factors ranked by jth individual.

The index ranking technique indicated that factor that has got highest index value is the most important constraining factor that impacted overall poultry production.

$$\text{Index} = \frac{\Sigma\ [(n \times \text{no. of F } 1^{st}) + (n\text{-}1 \times \text{no. of F}2^{nd}) + \ldots + (1 \times \text{no. of F last})] \text{ for each factor}}{\Sigma\ [(n \times \text{no .of F } 1^{st}) + (n\text{-}1 \times \text{no. of F}2^{nd}) + \ldots + (1 \times \text{no. of F last})] \text{ for all factor}}$$

Where:

no.= Number respondent ranked the factor 1^{st}.

n= Number of factors ranked.

F= Factors ranked.

Socio-economic characteristics of respondents

Majority of farm managers (69.7% in layer farms, 57.6% in broiler farmsand 76.8% in pullet farms) were male. The role of male and female in farm management practices were nearly proportional, albeit male values were greater. Majority, 62.1% of layer-farms and 58.9% of pullet-farms were owned by individual entrepreneurs and 72.7% of broiler farms was owned in group either in micro-and-small-scale enterprises or in cooperatives (Table 1). In terms of job opportunity creation, 74.2% of the farms hire labor for husbandry management.

Farm characteristics

The mean daily feed intake of layers, broilers and pullets in the studied farms were 94.21±1.23, 121.94±5.53and 60.09±2.02 gram respectively, which are lower than standard daily feed intake of different class of chickens as shown in Table 2. The result indicated that the chickens were under-fed because of some knowledge gap of farm operators. The result revealed that there were limitations in feeding and watering frequency in the farm, as 75% of the farmers provide feed three times per day and only 61,1% of the farmers provide water at adlib, these would have significant impact on farm productivity. Most farm managers (69.7%) do not know the amount of water provided to chickens on a daily basis. The duration of lightening indicated in the current study in layer, broiler and pullet farms were also lower and limited to day-time which might be because of lack of knowledge and /or absence of infrastructures in the study areas.

Constraints of small-scale commercial poultry production

In the current study a number of internal and external problems were identified and prioritized (Table 3). According to the study, the top five constraints challenging commercial poultry farms were high cost of feed, disease prevalence, feed shortage, shortage of finance and high cost of chickens in their order. A number of comprehensive constraints each comprising specific problems were identified and prioritized from 1-17^{th} in their order using index ranking techniques.

The result indicated that there were a number of specific problems related to each of the major constraints that directly or indirectly impacted poultry farms (Table 5). High feed cost was associated with inflated price of commercial feeds, price of feed ingredients, cost of feed transportation and limited accessibility of commercial feed suppliers and agents at nearby. With regards to poultry disease, the respondents have listed top economically important poultry diseases that were prevalent in commercial farms. Accordingly, NCD, Gumboro, fowl cholera, fowl-pox, coccidiosis and infectious-bronchitis were ranked 1^{st} - 6^{th} most prevalent chicken diseases, respectively (Table 4).

The result found that the highest mortality of chickens was recorded at the age of 1-3 weeks (72.4%) during the long-rainy season (61.5%), associated with a high prevalence of diseases during wet the season (74.7%). Infections occur during the long-rainy season (47.09%)and least in dry season (25.38%). The common symptoms exhibited in poultry farms are variable depending on the type and stage of disease, ageand breed of the chickens.

The study found that enteritis, body-weight loss, paralysis, head and eye swelling, reduced productivityand skin abrasion were the most common clinical symptoms appearing in commercial poultry farms (Fig 2).

Feeding and feed related constraints

Poultry farming is facing many challenges in the study areas, among which high cost of feed has been ranked as the 1st most important constraint. The rising cost of feed

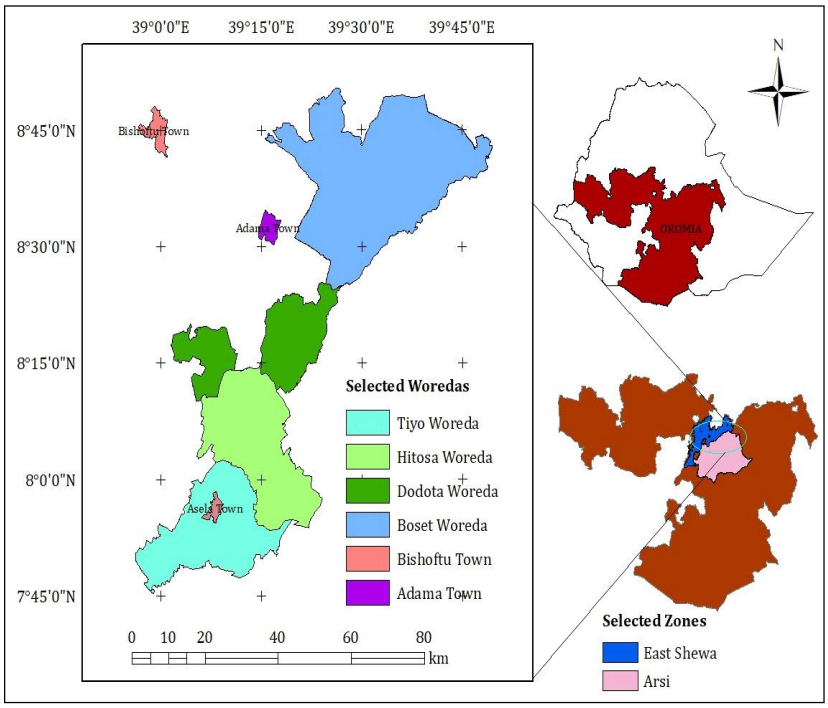

Fig 1: Map of study area.

Table 1: Socio-economic profile of respondents.

Criteria	Category	Layer-farm %(N)	Broiler-farm %(N)	Pullet-farm %(N)	Total %(N)
Managers sex	Male	69.7(92)	57.6(19)	76.8(43)	69.7(154)
	Female	30.3(40)	42.4(14)	23.2(13)	30.3(67)
Educational level	Illiterate	10.6(14)	6.1(2)	17.9(10)	11.8(26)
	Grade 1-8	43.9(58)	48.5(16)	28.6(16)	40.7(90)
	Grade 9-12	36.4(48)	27.3(9)	30.4(17)	33.5(74)
	> Grade 12	9.1(12)	18.2(6)	23.2(13)	14.0(31)
Respondents' major livelihoods	Farmers	53.3(73)	48.5(16)	48.2(27)	52.5(116)
	Un-employee	17.4(23)	15.2(5)	14.3(8)	16.3(36)
	Employee	18.2(24)	18.2(6)	19.6(11)	18.6(41)
	Trader	9.1(12)	18.2(6)	17.9(10)	12.7(28)
Previous poultry experiences?	Yes	79.5(105)	84.8(28)	80.4(45)	80.5(178)
	No	20.5(27)	15.2(5)	19.6(11)	19.5(43)
Who is more active in chicken management?	Male	50.0(66)	39.4(13)	51.8(29)	48.9(108)
	Female	36.4(48)	36.4(12)	30.4(17)	34.8(77)
	Both	13.6(18)	24.2(8)	17.9(10)	16.3(36)
Nature of farm (by ownership)	Individual-owned	62.1(82)	21.2(7)	58.9(33)	55.2(122)
	MSEs	29.5(39)	72.7(24)	33.9(19)	37.1(82)
	Cooperatives	8.3(11)	6.1(2)	7.1(4)	7.7(17)
Chicken population trend in last 3 years	Increasing	59.1(78)	54.5(18)	58.9(33)	58.4(129)
	Decreasing	22.7(30)	12.1(4)	32.1(18)	23.5(52)
	Constant	18.2(24)	33.3(11)	8.9(5)	18.1(40)

MSEs: Micro and small-scale enterprises, N=frequency.

Table 2: Farms' flock size, farm characters and price of different class of chickens (Mean ± SE).

Criteria	Layer farm	Broiler farm	Pullet farm
Flock size/cycle	790.42±74.72	1152.61±134.92	952.86±109.16
Production length (months)	17.42±0.35	2.18±0.09	2.58±0.09
Production cycle/year		2.85±0.15	3.20±0.08
Daily feed supply/chicken(gm)	94.21±1.23	121.94±5.53	60.09±2.02
Density of chickens per m^2 area	8.89±0.33	9.34±0.62	14.45±1.03
Lightening time/day in hours	4.61±0.31	6.75±0.71	8.00±0.68
Price of DOC	45.00±0.20	52.82±1.66	53.01±1.02
Price of broiler		398.33±11.39	
Price of pullet	211.67±3.80		207.67±2.33
Price of egg	9.48±0.16		

DOC: Day-old-chicken, SE; standard error, price in Ethiopian birr.

Table 3: Summary of problem ranking using Index and Garret ranking methods.

Factor	Index-ranking		Garrett's-ranking	
	Index-values	Rank	Garrett-Index	Rank
High feed cost	0.1014	1	77.4050	1
Health and Disease prevalence	0.0862	2	65.9127	2
Feed shortage and access	0.0818	3	63.2855	3
Finance shortage	0.0771	4	59.8195	4
High cost of chickens	0.0753	5	58.7801	5
Husbandry problems/lack of technical knowledge	0.0726	6	56.6661	6
Shortage/unavailability of chicken	0.0696	7	55.9258	7
Inadequate working places	0.0640	8	52.8100	8
Marketing problems	0.0594	9	50.0747	9
Poor credit	0.0579	10	49.3923	10
Poor extension services	0.0471	11	42.8213	11
Infrastructural problems	0.0428	12	41.1810	12
High medication cost	0.0378	13	38.2172	13
Poor veterinary services	0.0377	14	37.0828	14
Inadequate supply of lean water	0.0323	15	35.9380	15
Biosecurity problems	0.0302	16	34.1701	16
Poor vaccination scheme	0.0266	17	31.1181	17

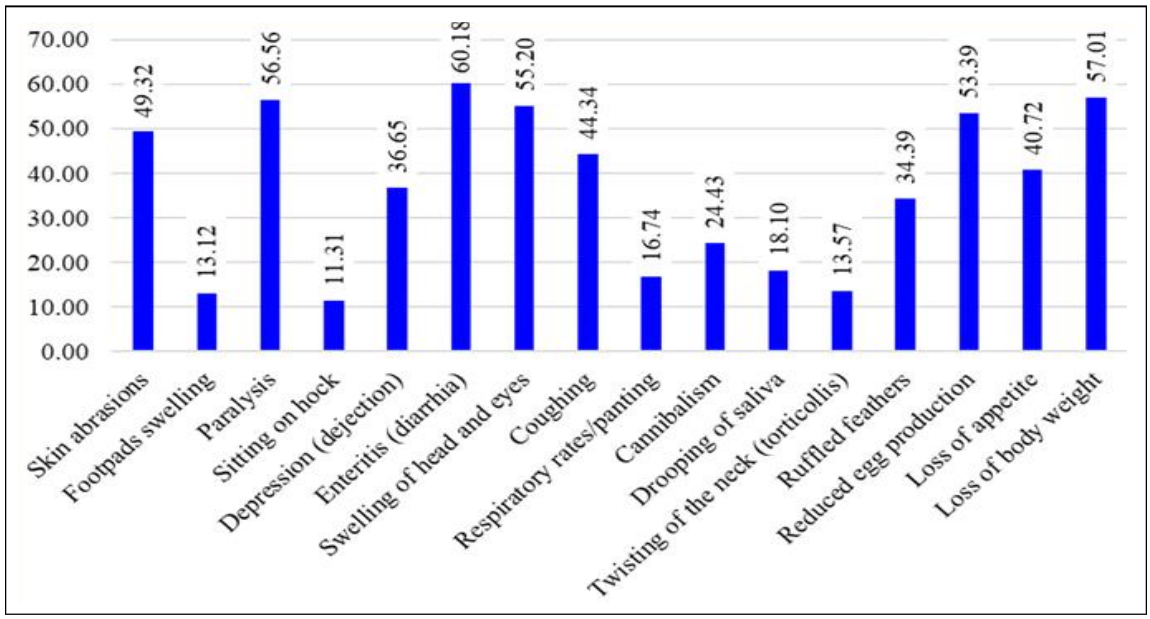

Fig 2: Per cent occurrence of common disease symptoms.

could be due to limited number of feed processing industries; high cost of feed ingredients, low productivity of oil crops required in poultry feed like soyabean, noug-seed, linseedand other food crops like maize; under performance of agro-processing industries resulted from shortage of input supply; high price of grainsand high transportation cost. High feed cost impacted the livestock industry at global level. In line with the current study, high feed cost was reported as the most critical challenge affecting poultry enterprises in different countries including Ethiopia (Swain *et al*., 2009; Bezabih *et al*., 2016; Yemane *et al*., 2016; Ebsa *et al*., 2019). Shortage of feed and access to commercial poultry feed was the third most important constraint that challenged poultry farms in the study area. Poor quality feed, feed adulterated with low-cost poor-quality ingredients, lack of know-how to formulate own-feed, inefficiency in feeding, shortage of supply, absence of feed-retailing agents at proximity and lack of information were the common problems associated with feeding and feed shortage. In agreement with this study, feed-shortage was reported to be among the most important constraint of poultry production in Debre-Markos areas of Ethiopia (Bezabih *et al*., 2016), Dzongu area of India (Nath *et al*., 2012) and Delta state of Nigeria (Ovwigho *et al*., 2009). Low plane of nutrition due to insufficient availability of good quality fodder/ feed affects the productivity of livestock industry (Gouri *et al*., 2012). High feed cost, poor quality and quantity of feeds attributed for low animal productivity that eventually caused shortage of supply in livestock products (Ebrahim, 2023).

Poultry disease and associated constraints

High prevalence of diseases, poor diagnosis and veterinary service quality, high cost of medication, poor vaccination and biosecurity practices were among the common problems. In this study disease prevalence was ranked as 2nd most important challenge in commercial poultry farms, whereas high-cost of medication, poor disease diagnosis, poor veterinary-service quality, biosecurity problemsand poor vaccination scheme were ranked 13th, 14th, 16th and 17th problems in small-scale commercial farms, respectively (Table 5). Chicken health problem was a very critical in the study area due to poor diseases information-communication system, low prevention and control strategies, inadequate biosecurity measurements, inefficient treatment of sick birds, incomplete vaccination, absence of veterinary-clinics and diagnostic laboratories. Study conducted in Bishoftu area of Ethiopia reported that disease outbreak and poor vaccination scheme were ranked 1st and 5th important constraints, respectively (Ebsa *et al*., 2019). High chicken mortality and lack of veterinary facility were reported as among the top ten constraint of poultry industry in Sivasagar district of Assamm, India (Islam and Nath, 2015). Another report indicated, unavailability of veterinary health service at right time and cost of medicine affected poultry enterprises in Goa state of India (Swain *et al*., 2009). Study conducted in Debre-Markos area of Ethiopia prioritized, high cost of medication, mortality of day old chickens, lack of veterinary care and inability to diagnose sick birds as the 10th, 14th, 18th and 19th, constraints in small-scale commercial farms, respectively (Bezabih *et al*., 2016).

In this study, Newcastle-disease, Gumboro, fowl-cholera, fowl-pox, coccidiosis and infectious bronchitis were consecutively ranked 1-6th. Study in Benishangul-Gumuz western Ethiopia indicated that NCD was the most prevalent disease affecting chicken production (Alemayehu *et al*., 2015). Study, in central Ethiopia reported that infectious-bursal-diseaseand coccidiosis affected young flocks in commercial farms (Chanie *et al*., 2009). Similar to the current finding Dhakal *et al*., (2019), reported that IBD, NCD, Coccidiosisand Infectious-bronchitis were the most prevalent economically important poultry diseases in their order affecting poultry industry in Nepal.

Finance and associated constraints

Financial constraints this study include, lack of initial capital, poor finance administration skill, poor/absence of credit institutions, lack of information about finance sources, high interest rate of credits, long procedures and collateral related to credit system. Accordingly, finance shortage was ranked 4th and poor credit system(access) was ranked 10th bottleneck affecting poultry industry. Absence finance and poor credit facility were due to low entrepreneurial skill, lack of information, lack of access to credit, lack of know-how on how and where to obtain creditand fear of credit in the society. Lack of access to credit and lack of seed-money were reported as the major constraints affecting semi-

Table 4: Ranking of highly prevalent poultry diseases.

Factors	Kosgey ranking		Garrett's ranking	
	Index-values	Rank	Garrett-index	Rank
Newcastle	0.2515	1	69.1674	1
Gumboro (IBD)	0.2150	2	59.3575	2
Fowl Cholera	0.1786	3	52.0090	3
Fowl pox	0.1383	4	44.2579	4
Coccidiosis	0.1164	5	39.8190	5
Infectious bronchitis	0.1002	6	35.3891	6

IBD: Infectious bursal disease.

Table 5: Details of specific farm constraints categorized under comprehensive problems.

1. Feed cost and access	**2. Chicken health and Diseases prevalence**	**3. Feed shortage and Quality**	**4. Financial problem**	**5. High cost of chickens**
High cost of feed commercial feed	Diseases prevalence (viral and bacterial)	Feed shortage and poor feed quality	Shortage of seed-money	High chickens' cost (pullets, DOC)
High cost of feed ingredients to make own-feed	Communication gap and late response of veterinarians	Lack of knowledge and skill to prepare own-feed	Financial administration skill -gap	Lack of alternative breeds with fair price
High feed transportation cost	Absence of disease recording	Knowledge gap in feeding practices	Shortage of running cost	Poor negotiating power of poultry-farmers on (price/age/type)
Lack of access to alternative commercial feeds at proximity	High mortality and morbidity of chickens	Feed adulteration with poor quality ingredients	Limited sources of finance (no alternatives)	
6. Husbandry problems	**7. Shortage and unavailability of chicken**	**8. Lack of working places**	**9. Marketing problems**	**10. Poor credit access**
Knowledge and skill gap in husbandry practices	Lack of alternative breeds	Lack of land resources for work and farm expansion	Seasonal fluctuation of demand and price (inputs/outputs)	Poor/absence of credit
Lack of farm registration, recording, evaluation	Shortage of chicken supply readily	Poor quality housing (ventilation, sanitation)	Lack of transportation, product preservation and storage facilities	Long procedures to get loan
Air pollution in residential areas	Low adaptation of some breeds	Cost of house renting	Effect of culture and religion (demand/price)	High interest rate on loan
Lack of trust among farms operators	Poor productivity of some breeds	Lack of waste disposal and dead -bird removal areas	Lack of market-linkage, communication, promotion and market distance	Challenge of collateral procedures
11. Poor extension services	**12. Infrastructural problems**	**13. High cost of medication**	**14. Poor diagnosis and veterinary services**	**15. Problem of access clean water**
Lack of comprehensive training across production value-chains	Regular disturbance of electric-power	High medication cost	Inadequate diagnose of sick-birds	Poor water quality
Poor communication among service providers and owners	Lack of all-weather roads	Higher payment for Veterinarians/experts	Inefficiency of medication and treatments	Disturbance of water supply
Poor service quality and, inaccessibility of service providers (private or public)	Lack of transportation facility	Veterinarians are not readily available	Inadequate laboratory service for disease identification	High cost of water
Poor demonstration and promotion of technologies and inputs	Inadequate quality water supply	Late response of veterinarians	Lack of well-organized public/private veterinary clinics	
6.Biosecurity problems		**17. Limited access to vaccine**		
●Predators, rodents and wild-bird problems		●Vaccines are not readily available		
●Lack of sustainable footbath utilization		●Limited vaccines (only for few diseases)		
●Absence of isolation, quarantine room		●Inadequate vaccination-service providers (private/public)		
●High trafficking and residentials around farms		●Poor vaccine storage and transportation facility		
●Improper action to sick birds		●Incomplete vaccination		

intensive poultry production in different areas of Ethiopia (Bezabih *et al*., 2016;Yemane *et al*., 2016). Similarly, financial problem was reported affecting commercial poultry farms in Daleta state, Nigeria (Ovwigho *et al*., 2009).

Chickens and associated constraint

Constraints related to high cost of improved and specialized chicken breed, timely unavailability of chickens when required at required quantity and quality, shortages of supply and absence of alternative breeds were very critical. High chicken price and unavailability of improved chicken were ranked 5th and 7th challenges of poultry farmers. Poultry producers were forced by chicken suppliers to buy any available type of chicken in terms of breed, age group, chicken type, regardless of the preference of producers with a fixed price set by suppliers. This is due to unavailability of sufficient hatcheries and multiplication centers in the region. The result coincides with (Bezabih *et al*., 2016), reported that high chicken-cost and unavailability of replacement chickens as 5th and 11th important constraint in commercial poultry enterprises, respectively. In Addis Ababa, unavailability of pullet in time and high-cost were ranked 3rd and 4th important constraints semi-intensive poultry farming, respectively (Yemane *et al*., 2016). High chicken cost was affecting the sustainability of poultry farming in Goa state of India (Swain *et al*., 2009).

Husbandry practices, work pace and infrastructure related constraints

Lack of adequate husbandry procedures, mismanagement and a lack of technical knowledge were consolidated into one major problem and ranked 6th in the in the current study. Such technical gaps and mismanagement were observed in most of the farms expressed in terms of improper housing, lighting, heating, flock density problem, bedding material mismanagement, feed and water trough arrangement gaps, lack of farm recording and evaluationand mismanagement of wastes. Such problems were perceived by poultry farmers due to lack of integration among extension service providers, input suppliers, infrastructure and utility providersand other stakeholders. Similar problems (lack of facilities, leadership problem, bad relationship, lack of operational and service efficiency, lack of strategic management plan) were categorized into internal factors that affected commercial poultry farms, though there are external factors like service and input providers that equally or even more impacted commercial farms (Chilala, 2019). The result is in line with (Islam and Nath, 2015) in India and (Dhakal *et al*., 2019) in Nepal who reported lack of technical knowledge of chicken farming as one of the major hurdle in growth of poultry enterprises. However, (Bezabih *et al*., 2016) reported lack of technical know-how in handling poultry as the 13th constraint in commercial poultry farms.

Lack of working place which includes shortage of land resource and poor-quality housing was also among the constraints listed by poultry farmers and it was ranked 8th important factor in this study. It includes shortage of space for farm expansion, waste disposal, quarantine, isolation and storage. Significant number of farmers were operating their chicken production in rented housing. This has limited the intensification, expansion and technology uptake of the farmers including their motivation. Similarly, lack of working place was reported as among the top-ten constraints in an intensive poultry production setup (Ebsa *et al*., 2019). Another study in Ethiopia reported lack working place as the 2nd most critical constraint in Addis Ababa (Yemane *et al*., 2016) and 3rd constraint in Debre-Markos (Bezabih *et al*., 2016).

Lack of infrastructure was rated as the 12th constraint and it encompasses lack of sustainable electric-power supply, lack of input multiplication and supply center, absence of all-weather road, absence of storage and transportation facilities. Most of the poultry producers were affected by frequent failure of electric-power in day-to-day poultry operation. Similarly Bezabih *et al*., (2016) reported electric disturbance as twelveth constraint in small-scale commercial farms. In concur with the current study, lack of transportation facility was reported as the main constraint in commercial farms in Delta state Nigeria (Ovwigho *et al*., 2009).

The fifteenth, constraint in the current study was problem of access to clean water which includes poor water quality, disturbance of water supplyand challenge to develop own-water sources like ground-waterand cost of water transportation to farm gate (Table 5). Lack of clean water has a perilous multiple effect on chicken productivity, chicken healthand farm biosecurity in given poultry farm.

Extension services and market related constraints

Well planned extension system that delivers knowledge, technology, input-package, services through extension education to end-users is important to transform livestock agriculture. Poor extension service includes poor communication scheme, lack of training and advisory services, poor input and technology supply schemeand distance from service providing centers.

Poor marketing system includes demand and price fluctuation, poor market-linkage, lack of market information and promotion, distance to market place, religious and cultural restrictions on products as described in Table 5. The result indicated that marketing problem and poor extension service were ranked 9th and 11th constraints. In line with the current study, (Yemane *et al*., 2016) in Addis Ababa, ranked market problem and inadequate training as 8th and 11th problems in intensive poultry farming, respectively. Singh *et al*.(2014), reported that poor extension educations in animal husbandry that includes budgetary support, institutional insurance coverage against animals' riskand technological supply were lacking.

CONCLUSION

The stagnant growth of agribusiness could not satisfy the ever-growing demand for egg and chicken meat. Escalating

cost of inputs (feed, chickenand medication), chicken health, shortage of inputs (feed, finance, chicken, landand vaccine), lack of technical knowledge (husbandry and leadership), poor market linkage, infrastructure (water, electricity, storage, road, transportation, full-fledged veterinary clinics and laboratories), extension service, insufficient access to affordable creditand poor-quality sanitation have challenged the poultry industry. However, such small-scale commercial production is the best preferred strategy to address the growing demands, as it involves a number of participants with optimum technological uptake. To accomplish that, it is a must to improve chickens' productivity and efficiency through proper intervention in tackling the afro-mentioned constraints through an integrated and participatory approach.

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Conflict of interest

The authors declare that they have no conflicts of interest.

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