

Characterization of Small and Medium Scale Commercial Chicken Production and Marketing Systems in Ethiopia

Alemayehu Amare and Etalem Tesfaye

Ethiopian Institute of Agricultural Research, Debre Zeit Agricultural Research Center,
P.O. Box: 32, Debre Zeit, Ethiopia

Abstract: The present study was designed to assess the situation that characterizes the production and marketing systems of the small and medium scale commercial chicken subsector in Ethiopia. For the study total of 203 respondents were selected using a snowball sampling method and data collected using a semi-structured questionnaire. Respondents grouped into the small (n=125) and medium (n=78) scales. Most of the respondents (74.4% and 84.6%) of the small and medium scale commercial chicken producers respectively were male. In the small and medium scale commercial chicken production, the respondent producers were out-growers. The majority (80.0%) of small scale commercial chicken producers had their own chicken house, while had an education status of college or university diploma/degree and were accounted for 42.4 and 60.3%, respectively in the scales. The majority (61.6%) of the small scale and (80.8%) of the medium scale commercial chicken producers were out-growers. The majority (80.0%) of small scale commercial chicken producers had their own chicken house, while (57.7%) of medium scale commercial chicken producers used rented chicken houses ($P<0.001$). The medium scale chicken producers use factory-made feeders was significantly ($P=0.002$) higher (74%) than the small scale counterparts (49.6%). Similarly, the medium scale chicken producers use factory-made drinkers were significantly ($P=0.001$) higher (92.3%) than the small scale counterparts (72.8%). Respondents who accessed chicken feed with a radius of 50 kilometers in the small scale were 86.4% and in the medium scale 54.2%. The incidence of disease was 51.2% and 30.8%, respectively in the small and medium scales commercial farms and the mortality of chicken was higher than the permissible level. The involvement of women in cleaning of poultry house and equipment was ranging 69.2-80.0% both in the small and medium scales farms. The involvement of men in farm input and product marketing was ranging 75.6-83.3% in both small and medium scale farms. Both small and medium scale commercial chicken producers reported that the major buyer of chicken meat and egg were collectors (77.6-81.8%) and the buyers of pullets were layer keepers (71.2-79.4%). Lack of land for chicken production, shortage of day-old chicks' supply and high price of feed were the top three constraints though respondents in both categories had ranked differently. The involvement of multiple arrays of actors both public and private in the value chain is critical to address the overall issues that affect the development of the sector.

Key words: Characterization • Commercial Chicken Production • Marketing System • Medium Scale • Small Scale

INTRODUCTION

In Ethiopia, the commencement of modern poultry production and the extension system was dated back to the early 1950s during the introduction of exotic chicken breeds for research and development [1]. However, the lack of emphasis given for the commercial chicken

production system resulted in the sluggish growth of the sector and still the village production system with its low production potential is responsible for the national egg and chicken meat demand [2, 3]. In the country, there are about 56 million chicken populations of which the exotic breeds account only 2.5% and contributed 17.3% of the national egg production [4]. This in turn resulted in the

low per capita consumption of egg and chicken meat (about half a kilogram of each) which is highly less than that of the Sub-Saharan (2.3kg) consumption and the world averages (4.5kg) [5].

The efforts made by the government to develop the poultry sector were limited since the Livestock Master Plan (LMP) is developed in 2015. The LMP is a five-year plan (2015-2020) that indicates the necessary facilities to be established, inputs to be availed, roles and responsibilities of stakeholders and policy actions to transform the production, consumption and export targets with a shift in production towards more commercially oriented operations and investments in the sector [6]. It has been planned to grow from 28 million eggs and 395 tonnes of chicken meat in the base year (2015) to 2, 916 million eggs and 126, 800 tonnes of chicken meat in 2020 though the envisioned plan could not implemented and brought the anticipated change indeed it requires to investigate why it happened. The egg production achieved from this sub-sector in 2019 (a year is left to end the transformation plan) was 38.6 million [7].

Despite the slow growth, the on-going commercial chicken production system can be categorized into three subsectors, namely small scale commercial, medium scale commercial and large scale commercial with a stock size of 50-1000, 1001-10,000 and above 10, 000 chickens, respectively [3]. The small and medium scale farms are growing in and around urban areas, though they are hardly dependent on few big or large scale farms for basic inputs such as day-old chicks and feed and are subjected to institutional, technical and financial constraints and lack of integration of the necessary facilities [8]. A thorough understanding of the situation under which chicken production and marketing take place in these systems could have a paramount importance to inform development workers and policy makers to consider the environment in which the commercial chicken farmers operate. It is therefore, this study was aimed to assess the situation and characterizing the production and marketing systems of the small and medium scale commercial chicken subsector.

MATERIALS AND METHODS

Selecting the Study Sites: The study sites were selected based on the availability and accessibility of poultry multiplication centers and breeder farms in and around, to the nearby source of chicken breeds, feed and other inputs. Accordingly, a total of seven sites (Bishoftu, Adama, Hawassa, Kombolcha, Mekelle, Gondar and Bahir Dar) were purposely selected.

Sampling Method: In Ethiopia, most of the commercial poultry producers are informal who do not have a legal license issued by the concerning institution [3], made it difficult to find the complete list of households (HH) engaged in farming and select the sample following the probability sampling methods. Hence, to select the study respondents, snowball sampling was applied. It is a method where existing subjects are asked to refer further subjects known to them [9]. From each site, 29 households and a total of 203 commercial chicken farmers were selected for the study and data were collected using semi-structured and pre-tested questionnaires from September 2017 to March 2018.

Data Analysis: The data collected through surveying of the small and medium scale commercial chicken farming households were entered into SPSS software package version 20. Descriptive statistics such as frequency, percentage and mean were computed. Chi-square (χ^2) test was computed to determine the relationship of chicken house ownership, type of feeders and drinkers employed with the scale of chicken production. Besides, index ranking method was employed to rank constraints of the small and medium scales commercial chicken production and marketing systems using the following formula:

Priority index = $(F1*3) + (F2*2) + (F3*1)/FT$, Where F1=Frequency of the first constraint; F2 = Frequency of second constraint; F3 = Frequency of third constraint; and FT = Frequency of total constraints.

RESULTS AND DISCUSSION

Socio-Demographic Characteristics of the Respondents:

In this study, the result showed (Table 1) that most of the respondents in the small scale commercial chicken production were male (74.4%) with age ranges of 15-30 years (44%) and education status of college/university graduate (42.4%). The same trend was observed in the medium scale commercial chicken production that the majority of the respondents are male (84.6%) with age ranges of 15-30 years (48.7%) and education status of college/university graduate (60.3%). Similarly, Yitbarek *et al.* [8] reported the sizable involvement of the males and literate individuals under the working groups of the population in general and in this subsector in particular. The majority (56.9%, 72.7%) of the respondents, respectively in the small scale and medium scale chicken production had a household size of 1-4 members. The result also revealed that the majority

Table 1: Socio-demographic characteristics of the study respondents

Variables		Small scale commercial	Medium scale commercial	Overall
Sex (%)	Male	74.4	84.6	78.3
	Female	25.6	15.4	21.7
Age group (% , years)	15-30	44.0	48.7	45.8
	31-45	42.4	42.3	42.4
	46-60	8.8	7.7	8.4
	> 60	4.8	1.3	3.4
Marital status (%)	Married	66.7	58.1	63.5
	Single	31.4	41.9	35.2
	Divorced	1.9	0.0	1.2
Education level (%)	Read and write	6.4	2.6	4.9
	Primary school	20.0	9.0	15.8
	High school completion	31.2	28.2	30.0
	College/university graduate	42.4	60.3	49.3
Household size (%)	1-4 members	56.9	72.7	63.0
	5-8 members	37.4	20.8	31.0
	9-12 members	5.7	6.5	6.0
Chicken farming experience (% , years)	1-3 years	87.2	74.4	82.3
	4-6 years	8.0	17.9	11.8
	7-9 years	2.4	6.4	3.9
	10-12 years	2.4	1.3	2.0

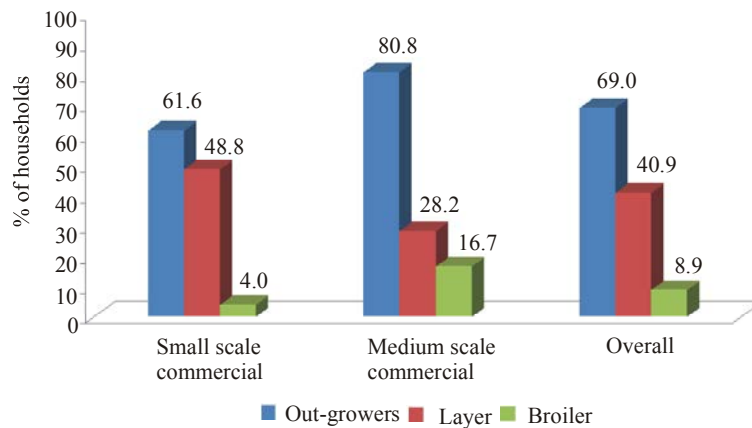


Fig. 1: Types of chicken farming operated under small and medium scale farms of the study areas

Percentage values under each category are greater than 100%, implies that some respondents were engaged in two or more types of chicken production

of the respondents in the small scale production (87.2%) and medium scale production (74.4%) had relatively low (1-3 years) chicken farming experience which is partially justified by the presence of frequent turn-over of producers [3]. Lestari *et al.* [10] also reported that 68.3% of respondents in the South Sulawesi province of Indonesia had HH size of 4-6 persons with the mean value of 4.1. This magnifies that the significant contribution of the sub-sector as a source of employment for an educated group of the population and means of family livelihood. However, particular emphasis should be given to increase the involvement and empowering of women in the venture and filling of the technical gaps that might be emanated as a result of the lack of experience in the commercial chicken production.

Types of Chicken Production: The present study revealed that the majority (61.6%, 80.8%) of the small scale and medium scale commercial chicken producers, respectively were out-growers (raised day-old chicks from 45 to 90 days). The result also showed that the proportion of layer producers in the small scale commercial were 48.8% and in the medium scale commercial 40.9%. The proportion of respondents in the small and medium scale category keeping broiler were relatively small, 4.0% and 16.7%, respectively (Figure 1).

Housing, Feeders and Drinkers: The ownership of the chicken house, the types of feeders and drinkers used is presented in Table 2. The results showed that the majority (80.0%) of the small scale commercial chicken producers

Table 2: Chicken house ownership of the respondents

Scale of the chicken farm	Chicken house ownership (%)		χ^2	P-value
	Own	Rented		
Small scale commercial (n=125)	100 (80.0)	25 (20.0)	30.203	0.000
Medium scale commercial (n=78)	33 (42.3)	45 (57.7)		

Table 3: The types of chicken feeders used by the respondents

Scale of the chicken farm	Factory-made feeders	Locally made feeders the same as factory products	Feeders modified from locally available materials	χ^2	P-value
Small scale commercial (n=121)	60 (49.6)	43 (35.5)	18 (14.9)	12.22	0.002
Medium scale commercial (n=77)	57 (74.0)	12 (15.6)	8 (10.4)		

Table 4: The types of chicken drinkers used by the respondents

Scale of the chicken farm	Factory-made drinkers	Drinkers modified from locally available materials	χ^2	P-value
Small scale commercial (n=125)	91 (72.8)	34 (27.2)	11.55	0.001
Medium scale commercial (n=78)	72 (92.3)	6 (7.7)		

had their own chicken house that HHs in this category modifies the house that they have in their compound and use for chicken production. On the other hand, the majority (57.7%) of medium scale commercial chicken producers used rented houses for their business, while the rest (42.3%) had own houses and these results were differ significantly ($p < 0.001$). The result of the present study is not in agreement with the reports of Negro-Calduch *et al.* [11] who noted a 61.3% of small-scale broiler producers in central Egypt were used rented chicken houses. The medium scale chicken producers were using factory-made feeders and significantly ($P = 0.002$) higher (74%) than the small scale counterparts (49.6%). Similarly, the medium scale chicken producers using factory-made drinkers was significantly ($P = 0.001$) higher (92.3%) than the small scale counterparts (72.8%). Similarly, Eltholth *et al.* [12] reported that the use of modern feeders and drinkers is higher in farms with large flock sizes than those having small flock sizes. Using appropriate feeders and drinkers helps to prevent feed wastage and the problem of wet litter resulting from drinker spillage and leakage [13, 14]. It has been observed that the feeders and drinkers that farmers modified from locally available materials such as round plastic basins and folded sheet metals. These types of equipment do not construct with the correct height and depth, stable enough to prevent knocking over and do not have bird proof (such that birds can get into it or roost on it) and contaminate the feed and water with their droppings and litter.

Accessibility, Quality and Cost of Chicken Feed: Most of the respondents in small scale commercial (86.4%) and medium scale commercial (54.2%) reported that they had the access to good quality chicken feed within a 50

kilometres radius (Table 5 and Figure 2). This might happened that the feed formulated by the reputed processing plants was supplied by retailing agents at the nearest distance of most farmers. However, 66.7% of the small scale and 73.3% of the medium scale commercial chicken producers had purchased a 100 kg of feed with a cost of 951.00 to 1150.00 Ethiopian Birr which about half of the respondents in both groups reported that the price of feed was very expensive (Table 6 and Figure 3). The present findings were in agreement with the reports of Bediye *et al.* [15] who noted that the price of major compound feed ingredients increased by 52% on average per tonne and 11% per annum per tonne. Similarly, Alemneh and Getabalew [16] also justify the present findings that the insufficient availability of feed mills, little attention given to the least-cost formulation of rations and import dependence on supplies of some ingredients added to the overall cost of feed in many parts of the country. The finding of the present study implies that the cost of feed is a contending issue that needs to be addressed with the involvement of multi-sectorial institutions along the value chain.

Disease Outbreak and Mortality: The incidence of disease outbreak and mortality of chicken in small and medium scale commercial farms is presented in Table 7. In small scale commercial farms, 51.2% of respondents reported the incidence of disease outbreak in their farms and the associated mortality of chicks (5.9%), growers (4.2%) and layers (6.7%) and broiler starters (6.2%) and broiler finishers (6.9%). In medium scale commercial farms, 30.8% of respondents reported the incidence of disease outbreak in their farms and the associated mortality of chicks (5.4%), growers (4.7%) and layers (4.3%) and broiler starters (5.3%) and broiler finishers (2.7%).

Table 5: The distance of chicken farms from the source of the feed supply (%)

Scale of the chicken farm	Distance in kilometres (km) from the feed source		
	≤ 50 km	200-500km	501-800km
Small scale commercial (n=103)	89 (86.4)	9 (8.7)	5 (4.9)
Medium scale commercial (n=72)	39 (54.2)	27 (37.5)	6 (8.3)
Overall (175)	128 (73.1)	36 (20.6)	11 (6.3)

Table 6: The cost of 100 kg of chicken feed (%)

Scale of the chicken farm	Price (ETB)		
	750-950	951-1150	1151-1350
Small scale commercial (n=117)	21 (17.9)	78 (66.7)	18 (15.4)
Medium scale commercial (n=75)	9 (12.0)	55 (73.3)	11 (14.7)
Overall (192)	30 (15.6)	133 (69.3)	29 (15.1)

ETB = Ethiopian Birr; the exchange rate of 1 USD during the study period was 27.4808 ETB

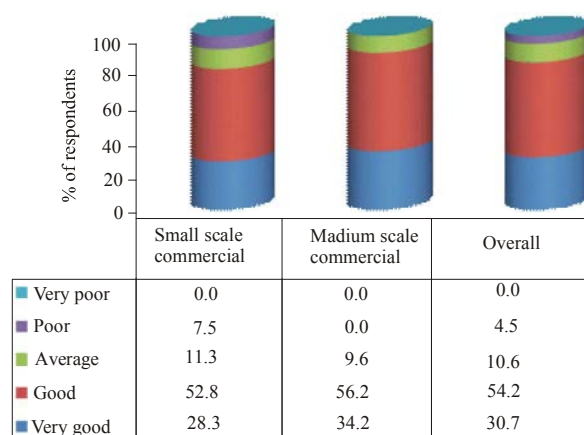


Fig. 2: Attitude of respondents on chicken feed quality

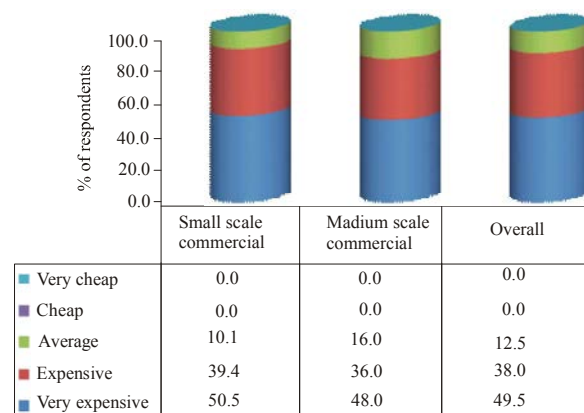


Fig. 3: Attitude of respondents on the price of chicken feed

The mortality reported in the present study was higher than the permissible level for both layer and broiler chickens. According to Prabakaran [17], the permissible mortality level for commercial layers - brooding phases (4%), growing phase (2-3%) and laying phases (6-8%) and

4% for commercial broilers over the entire growth phase up to marketable age. The present results were also higher than the reported values by Wondmeneh *et al.* [18] who noted the mortality of chicks of 3.9%, growers 3.5% and layers 3.2%; and broilers starter of 2.9% and finisher 3.5% in Ethiopia. Besides, the mortality of pullets in the farms (chicks and growers) of the current study was 10.1% and is higher than the 6-8% recorded by commercial chicken farms before 20 years ago in Ethiopia, Alemu and Tadelle [1] that implies much work should be done in this regard.

Household and Hired Labour Contribution: The relative contribution of HH and hired labour in the small and medium scale commercial chicken farms is presented in Table 8 and 9. In small scale commercial chicken production, the involvement of women was feeding and watering (67.5%), cleaning of poultry house and equipment (80%), while the contribution of men was farm input and product marketing (75.6%), vaccination (59.5%) and medication (55.6%). On the other hand, in medium scale commercial chicken farms the contribution of women and hired labor were feeding and watering (56-64%) and cleaning of poultry house and equipment (61-69%), while the involvement of men was farm input and product marketing (83.3%), vaccination (63.2%) and medication (60%). Both the small and medium scales commercial production respondents reported that the involvement of hired labor in chicken slaughtering/dressing was 66.7% and 90%, respectively. Similarly, Okoh *et al.* [19] noted that women contributed more in chicken feeding and watering (63.1%), collecting and storing eggs (63.9%) and cleaning of the pens (62.1%). However, 62% of the small and medium scale commercial poultry farmers in Ethiopia reported that both men and women are involved in all husbandry and marketing activities of commercial chicken production [3].

Table 7: Incidence of disease outbreak and mortality of chickens in the small and medium scale commercial farms

Scale of the chicken farm	Incidence of disease outbreak (%)	Layer mortality (%)			Broiler mortality (%)	
		Chicks (Wk 0-8)	Growers (Wk 9-20)	Layers (Wk 21-72)	Starter (Wk 0-21)	Finishers (Wk 21-45)
Small scale commercial	51.2	6.3	3.8	7.6	6.2	6.9
Medium scale commercial	30.8	5.4	4.7	4.3	5.3	2.7
Overall	43.3	5.9	4.2	6.7	5.6	3.8

Table 8: Household and hired labors contribution in small scale commercial chicken farms

Types of activities performed	Household labor (%)			Hired labor (%)
	Men	Women	Children	
Feeding and watering	55.0	67.5	11.7	19.2
Cleaning of poultry house and equipment	40.0	80.0	18.3	36.7
Farm inputs and products marketing	75.6	59.3	6.5	4.9
Vaccination	59.5	47.3	3.6	18.9
Medication	55.6	52.4	11.4	13.8
Chicken slaughtering/dressing	16.7	16.7	0.0	66.7

Percentage values of each activity across the rows are greater than 100, implies that multiple response variables.

Table 9: Household and hired labor contribution in medium scale commercial chicken farms

Types of activities performed	Household labor (%)			Hired labor (%)
	Men	Women	Children	
Feeding and watering	38.5	64.1	16.7	56.4
Cleaning of poultry house and equipment	32.1	69.2	23.1	61.5
Farm input and product marketing	83.3	41.0	2.6	12.8
Vaccination	63.2	38.2	2.6	34.2
Medication	60.0	45.7	7.2	27.1
Slaughtering/dressing	0.0	10.0	0.0	90.0

Percentage values for each activity across the rows are greater than 100, implies that both household members and hired labor were involved in a given activity.

Table 10: Buyers of egg, chicken meat and pullets and systems of selling

Scale of the chicken farms	Egg and poultry meat buyers (%)				Pullet buyers (%)			Systems of selling (%)	
	Individual consumer	Hotels & restaurants	Super-markets	Collectors	Layer keepers	NGO	Agri. Off.	Through middlemen	Direct to buyers
Small scale	32.8	25.4	40.3	77.6	71.2	28.8	49.3	89.2	27.5
Medium scale	21.2	30.3	39.4	81.8	79.4	42.9	52.4	78.2	38.5
Overall	30.0	27.0	40.0	79.0	75.0	35.5	50.7	84.8	3.18

Percentage values under each category of chicken product are greater than 100, implies that some respondents were sold their farm products for two or more buyers

Marketing of Egg, Chicken Meat and Pullets: Marketing of chickens and their products assessed in the current study is presented in Table 10. Small scale commercial chicken producers reported that the major buyers of chicken meat and egg and pullets were collectors and layer keepers (produce table eggs for consumption) were 77.6 and 71.2%, respectively. The same result was observed in medium scale commercial chicken production that the buyers of chicken meat and egg and pullets were collectors and layer keepers were 81.8 and 79.4%, respectively. The results coincide with Demeke and

Getnet [20] who reported 85% of the small and medium scale farms were sell egg and chicken meat to collectors who have market network with hotels, restaurants and supermarkets. Most of the small scale chicken producers do not have retail shops, FAO [2] and the interference of middlemen negatively affects the required profit that farmers might obtain as 84.4% of the respondents in both categories report middlemen were involved in the marketing of farm products. Similarly, Eltholth *et al.* [12] reported that broiler producer farmers in Egypt sold farm products through the middlemen. This means that a

Table 11: Constraints of small and medium scale commercial chicken production (index and rank)

Constraints	Small scale commercial		Medium scale commercial	
	Index	Rank	Index	Rank
Lack of land for chicken production	0.184	2 nd	0.203	1 st
Shortage of day-old chicks' supply	0.140	3 rd	0.171	2 nd
High price of feed	0.186	1 st	0.167	3 rd
Lack of reliable market for farm products	0.110	4 th	0.104	4 th
High cost of chicken	0.089	5 th	0.086	6 th
Diseases	0.085	6 th	0.088	5 th
Lack of access to capital	0.062	8 th	0.068	7 th
Shortage of veterinary supplies	0.064	7 th	0.050	8 th
Lack of training	0.040	10 th	0.045	9 th
Lack of extension support	0.041	9 th	0.020	10 th

chicken product marketed at the farm-gate or delivered to retailers or consumers at their disposal and whoever the buyer is, middlemen are involved to manipulate the market for their benefits. Hence, the farmers are made to be price takers and this leads to their selling below economic prices since the products are perishable and the farmers do not have the facilities to add value and increase the shelf life of the products [21].

Constraints of Commercial Chicken Production and Marketing:

The major constraints encountered by the small and medium scale intensive poultry farmers in the study area were presented in Table 11. The top five constraints faced by small scale commercial chicken producers were high price of feed (1st), lack of land for chicken production (2nd), shortage of Day-Old Chicks' supply (3rd), lack of reliable market for farm products (4th) and high cost of chicken (5th). Similarly, the major constraints reported by medium scale commercial chicken producers were lack of land for chicken production (1st), shortage of day-old chicks' supply (2nd), high price of feed (3rd), lack of reliable market for farm products (4th) and diseases (5th). The results of the present study reported by small and medium scale commercial respondents justify the situation under which producers in both groups were carried out production. The high price of feed being reported by small scale commercial chicken producers as a forefront constraint might be explained by the smaller scale of production results to the higher cost of operation which feeds accounts 70-75% of the cost of production. Kuppusamy [22] argued that total variable costs as well as total costs per bird have been found highest on small farms. On the other hand, lack of land for chicken production being reported by the medium scale commercial producers as a number one constraint partially justified by the negative effects imposed on the sustainable production and plan of farm expansion and the money spend for house rent as most of the

respondents in this category were rear chicken by rented houses. In line with this argument, Ebsa *et al.* [23] reported that high cost of rental house was among the major constraints facing commercial poultry producers in Bishoftu, Ethiopia. Different authors reported various findings, though the ranks assigned for the constraints were varied. In agreement with the current study, Yemane *et al.* [24] in Addis Ababa and Swain *et al.* [25] in Goa state of India reported that the high price of feed was the first constraint faced by small scale commercial poultry producers. The result of the presented study reported by medium scale commercial chicken producers is in line with the findings of Onono *et al.* [26] who noted that lack of land/space for keeping birds was the number one constrain in the commercial layer poultry farming in Nairobi, Kenya. Similarly, Ebsa *et al.* [23] in Bishoftu and Ugwu [21] in Lagos reported that high cost/inadequate supply of day-old-chicks was among the top three constraints affecting the commercial poultry producers of the area. In agreement with the results of the present study reported by respondents of both groups, Ebsa *et al.* [23] in Bishoftu and Yitbarek *et al.* [8] in Debre Markos explained that lack of market linkage and market instability was the fourth constraint facing commercial poultry production in these areas. Besides, Ugwu [21] reports the fluctuations in the prices of eggs and inadequate market outlets lead to glut and egg spoilage in Lagos. The result of the current study reported by the small scale commercial chicken producers is in agreement with Yitbarek *et al.* [8] who explained that high cost of chicken was the fifth constraint in and around Debre Markos. Similarly, the result reported by medium scale producers is in line with Ghasura *et al.* [27] who pointed out disease was the fifth problem in Banaskantha district of Gujarat State. Furthermore, lack of access to capital, shortage of veterinary supplies, lack of training and lack of extension support were among the constraints ranked 7th to 10th, though respondents in both categories had

ranked differently. The results magnify, to ensure the sustainability and profitability of the venture, a multitude of efforts involving relevant stakeholders should be made to remove the constraints.

CONCLUSIONS

The small and medium scale commercial chicken production and marketing systems could be a great potential for employment opportunity, income generation, nutrition security and family livelihood. However, most of the farming households operate under a tough environment where the required inputs such as land, improved chicken breed, feed, veterinary supplies do not put in place both for the small scale and medium scale commercial chicken production with a sufficient amount, quality and reasonable price. The concurrent changes in the market situation together with inappropriate interference of middlemen affect the possible maximum profit those producers might obtain from the venture. Therefore, the development of the small and medium scale commercial chicken subsector should be viewed in the context of addressing the entire value chain. Engaging and mobilizing the multiple arrays of actors, both public and private, involved in the value chain is critical to address the many issues occur in developing the sector.

ACKNOWLEDGMENTS

The authors would like to thank the Ethiopian Institute of Agricultural Research (EIAR) for funding this study. Respondent farmers and individuals who participated in the survey data collection are also acknowledged for their time.

REFERENCES

1. Alemu, Y. and D. Tadelle, 1997. The status of poultry research and development in Ethiopia, research bulletin No 4, poultry commodity research program, Debre Zeit Agricultural Research Center. Alemaya University of Agriculture, Ethiopia, pp: 62.
2. FAO, 2019. Poultry Sector Ethiopia. FAO Animal Production and Health Livestock Country Reviews. No. 11. Rome.
3. Vernooij, A.G., J.M.R. Cornelissen, I.J.M. Claassen, E. Beitler, H.L. Rees, A. Giani and S. Cloezeman, 2012. Poultry in Ethiopia: a survey of production, value chain and marketing of commercial poultry in Ethiopia. Netherlands-Africa Business Council.
4. Central Statistics Authority (CSA), 2017. Livestock and livestock characteristics (private peasant holdings). Agricultural sample survey 2016/17 (2009 E.C). V II. Statistical Bulletin 585. Addis Ababa, Ethiopia.
5. Boere, A., A. Vernooij, J. Cornelissen, A. Giani, I. Claassen, E. Beitler, H.V. Rees, H. Duns, R. Duns and S. Kloezeman, 2015. Business opportunities Report Poultry #3 in the series written of the "Ethiopian Netherlands business event 5-6 November 2015, Rijswijk, The Netherlands.
6. Shapiro, B.I., G. Gebru, S. Desta, A. Negassa, K. Nigussie, G. Aboset and H. Mechal, 2015. Ethiopia livestock master plan. ILRI Project Report. Nairobi, Kenya.
7. Central Statistics Authority (CSA), 2019. Livestock and livestock characteristics (private peasant holdings). Agricultural sample survey 2018/19 (2011 E.C). V II. Statistical Bulletin 588. Addis Ababa, Ethiopia.
8. Yitbarek, M.B., B.T. Mersso and A.M. Wosen, 2016. Constraints of Small-Scale Commercial Poultry Farms Analyzed by Garrett's Ranking Technique in and around Debre Markos, Amhara Region, Ethiopia. World's Veterinary Journal, 6(4): 203-209.
9. Lewis-Beck, M., A.E. Bryman and T.F. Liao, 2003. The sage encyclopedia of social science research methods. Thousand Oaks: SAGE.
10. Lestari, V.S., S.N. Sirajuddin and K. Kasim, 2011. Adoption of Biosecurity Measures by Layer Smallholders. Journal of the Indonesian Tropical Animal Agriculture, 36(4): 297-302.
11. Negro-Calduch, E., S. Elfadaly, M. Tibbo, P. Ankers and E. Bailey, 2013. Assessment of biosecurity practices of small-scale broiler producers in central Egypt. Preventive Veterinary Medicine, 110(2): 253-262.
12. Eltholth, M.M., R.A. Mohamed, F.A. Elgohary and E.A. Abo Elfadl, 2016. Assessment of biosecurity practices in broiler chicken farms in Gharbia Governorate, Egypt. Alexandria Journal for Veterinary Sciences, 49(1): 68-77.
13. Dann, A.B., 1923. Wet litter in the poultry house. Poultry Science, 3(1): 15-19.
14. Dunlop, M.W., A.F. Moss, P.J. Groves, S.J. Wilkinson, R.M. Stuetz and P.H. Selle, 2016. The multidimensional causal factors of 'wet litter' in chicken-meat production. Science of the Total Environment, 562: 766-776.

15. Bediye, S., G. Nemi and H. Makkar, 2018. Ethiopian feed industry: Current status, challenges and opportunities. *Feedipedia - Animal Feed Resources Information System*, V(50).
16. Alemneh, T. and M. Getabalew, 2019. Exotic chicken production performance, status and challenges in Ethiopia. *International Journal of Veterinary Science and Research*, 5(2): 039-045.
17. Prabakaran, R., 2003. Good Practices in Planning and Management of Integrated Commercial Poultry Production in South Asia, FAO Animal production and health paper, 159, Food and Agriculture Organization of the United Nations, Rome, Italy.
18. Wondmeneh, E., A. Alemayehu, S. Bewket and F. Tigereda, 2017. Status of commercial poultry production in Ethiopia, Poultry Working Group, Ministry of Agriculture. Addis Ababa, Ethiopia.
19. Okoh, S.O., S.A. Rahman and H.I. Ibrahim, 2010. Gender participation in commercial poultry production in Karu and Lafia Areas, Nasarawa State, Nigeria. *Livestock Research for Rural Development*, 22(9): 1-5.
20. Demeke W. and H. Getnet, 2020. Business Opportunity Report - Invest in the Ethiopian Poultry Sector 2020. Ethiopia-Netherlands Trade for Agriculture Growth Project. Addis Ababa, Ethiopia.
21. Ugwu, D.S., 2009. Baseline study of small and medium scale poultry production in Enugu and Lagos States of Nigeria. *World Journal of Agricultural Sciences*, 5(1): 27-33.
22. Kuppusamy, D., 2015. Economics of poultry farming: a critical review. *International Journal of Economic and Business Review*, 3(8): 63-67.
23. Ebsa, Y.A., S. Harpal and G.G. Negia, 2019. Challenges and chicken production status of poultry producers in Bishoftu, Ethiopia. *Poultry science*, 98(11): 5452-5455.
24. Yemane, N., B. Tamir and A. Mengistu, 2016. Constraints, opportunities and socio-economic factors affecting flock size holding in small scale intensive urban poultry production in Addis Ababa, Ethiopia. *Agriculture and Biology Journal of North America*, 7(3): 146-152.
25. Swain, B.K., J.A. Kumar, P. Parit and V.S. Korikanthimath, 2009. Constraint analysis of commercial poultry farming in Goa. *Indian Journal of Poultry Science*, 44(1): 137-138.
26. Onono, J.O., P. Alarcon, M. Karani, P. Muinde, J.M. Akoko, C. Maud and J. Rushton, 2018. Identification of production challenges and benefits using value chain mapping of egg food systems in Nairobi, Kenya. *Agricultural Systems*, 159: 1-8.
27. Ghasura, R.S., A.S. Sheikh, B.K. Aswar and R.M. Rajpura, 2012. Constraint analysis of poultry farm entrepreneurs in Danaskantha District. *Wayamba Journal of Animal Science*, pp: 390-393.