

Management practices and constraints of commercial layer poultry production in Mekelle City, Tigray, Northern Ethiopia

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Abstract

A cross sectional study was conducted from February 2024 to July 2024 with the objective of assessing the management practices and constraints of commercial layer poultry production in Mekelle City. A purposive sampling technique was used to select respondents who were engaged in commercial layer poultry production. Data on the management practices and constraints of commercial layer poultry production was collected by face-to-face interview using structured and semi-structured questionnaires from respondents (n=70). A Statistical Package for Social Sciences (SPSS) version 20(2018) was used to analyze the data. Of the total interviewed respondents, 51.4% of them were male head owning between 100-500 Bovans brown hens (72.9%). The study has also shown that, 97.1% of the respondents fed their chickens with commercial balanced feed. Diseases prevalence was reported by 67.1% of the respondents though 91.4% of them vaccinate their chickens against various types of diseases. Regarding housing, 98.6% of the poultry houses were deep litter system with poor ventilation. The study also revealed that, 87.1% of the respondents sell their eggs on farm and off farm. Lack of credit services, shortage and high cost of feed and lack of training services are among the major constraints for commercial layer poultry production in the study area. In conclusion, the current study has assessed the management practices and constraints of commercial layer poultry production in the study areas. Therefore, governmental and non-governmental organizations intervention is a paramount importance to overcome the existing constraints and improve livelihood of the poultry farmers.

Keywords: Commercial, constraints, layers, management, poultry, production



Pratiques de gestion et contraintes de la production avicole commerciale de poules pondeuses dans la ville de Mekelle, Tigray, nord de l'Éthiopie

Résumé

Une étude transversale a été menée de février 2024 à juillet 2024 dans le but d'évaluer les pratiques de gestion et les contraintes de la production avicole commerciale de poules pondeuses dans la ville de Mekelle. Une technique d'échantillonnage raisonné a été utilisée pour sélectionner les répondants engagés dans cette activité. Les données sur les pratiques de gestion et les contraintes ont été recueillies par entretien en face-à-face à l'aide de questionnaires structurés et semi-structurés auprès des répondants (n=70). Les données ont été analysées à l'aide du logiciel Statistical Package for the Social Sciences (SPSS) version 20 (2018). Parmi les répondants interrogés, 51,4 % étaient des hommes possédant entre 100 et 500 poules Bovans brunes (72,9 %). L'étude a également montré que 97,1 % des répondants nourrissaient leurs poules avec des aliments commerciaux équilibrés. La prévalence des maladies a été signalée par 67,1 % des répondants, bien que 91,4 % d'entre eux vaccinent leurs poules contre diverses maladies. Concernant le logement, 98,6 % des poulaillers utilisaient un système de litière profonde avec une ventilation insuffisante. L'étude a également révélé que 87,1 % des répondants vendaient leurs œufs à la ferme et en dehors. Le manque de services de crédit, la pénurie et le coût élevé des aliments, ainsi que le manque de formations figurent parmi les principales contraintes de la production avicole commerciale dans la zone d'étude. En conclusion, cette étude a permis d'évaluer les pratiques de gestion et les contraintes

de la production avicole commerciale dans les zones étudiées. Par conséquent, une intervention des organisations gouvernementales et non gouvernementales est d'une importance capitale pour surmonter les contraintes existantes et améliorer les moyens de subsistance des aviculteurs.

Mots-clés : Commercial, contraintes, poules pondeuses, gestion, aviculture, production.

Introduction

Poultry production is deeply embedded in Ethiopian society kept by all strata of society from the landless rural poor to the well off in the cities (Tadelle, 2003).

Ethiopia has about 60% of the total chicken population of East Africa, which includes local, exotic and hybrid chicken breeds, and about 78.85% of the Ethiopian poultry population consists of indigenous chickens, while the remaining 21.14% consists of exotic and hybrid breeds of chickens. The total number of poultry at country level is estimated at around 57 million (CSA, 2021). Poultry plays an important role in the human economy, supplying food, creating wealth through job creation for the booming population. The nutritional benefits derived from poultry products include animal proteins, minerals, fat-soluble vitamins, carbohydrates; pigments, fluids, and cholesterol are attributable to its relevance as the world major source of food. It is also relevant for industrial uses in the supply of vaccines, fertilizers, animal feed, and pharmaceuticals, including preservatives during semen storage, in paint and adhesives, varnishes and printing ink (Ugbe *et al.*, 2020).

In Ethiopia, the economic contribution of the poultry production sector is not still proportional to the huge chicken numbers, due to the presence of many productions, reproduction and infrastructural constraints (Abera, 2000). The chicken population growth over the year almost stagnant because of high chicken mortality due to lack of adaptation of introduced exotic chicken, diseases, predators prevalent in the

scavenging production systems and limited expansion of commercial poultry production both in terms of number of operators and volume of operation (CSA, 2021).

In Tigray, Northern Ethiopia, commercial poultry production is motivating and many youths are involved in the sector (Teshome *et al.*, 2017). However, the average household consumption is less than 0.3 eggs per person per week and egg prices are highly seasonal with monthly deviations from the annual average ranging between -16 and +13 percent. Egg prices are higher in September and October, about 10 percent above the annual mean. They decrease during December and in March and April, months containing long Orthodox fasting seasons when demand for eggs plummets. During this period, egg prices are about 15 percent below the annual mean (Kalle *et al.*, 2020).

These endeavors are, however, faced with a number of challenges and obstacles as causes to limit the success of commercial poultry production which include disease, biosecurity, feed, poor housing, and low inputs of veterinary services (Teshome *et al.*, 2017). The existing studies on poultry production in Tigray are focused on one or limited production systems; such as semi-intensive, backyard, and pullet growers, but there is lack of adequate information on the management practices and constraints of commercial layer poultry production. Therefore, the objective of this study was to assess the management practices and constraints of commercial layer poultry production in Mekelle City.

Materials and methods

Description of the study area

Mekelle, is a special zone and capital of the Tigray Region of Ethiopia. It was formerly the capital of Enderta awraja in Tigray. It is located about 780 kilometers north of the Ethiopian capital city Addis Ababa, with an elevation of 2,254 meters above sea level. It is situated in a geographic coordinate of 13°43' N latitude and

39° 37' E longitudes with average annual rainfall and temperature of 89. 81 mm and 19.66 °C respectively. The average monthly temperature of the area is 17.6°C. The amount of rainfall is variable in Mekelle; on average about 600 mm, and more than 70% of it falls between July and August, followed by long dry season (Kibrom, 2005).

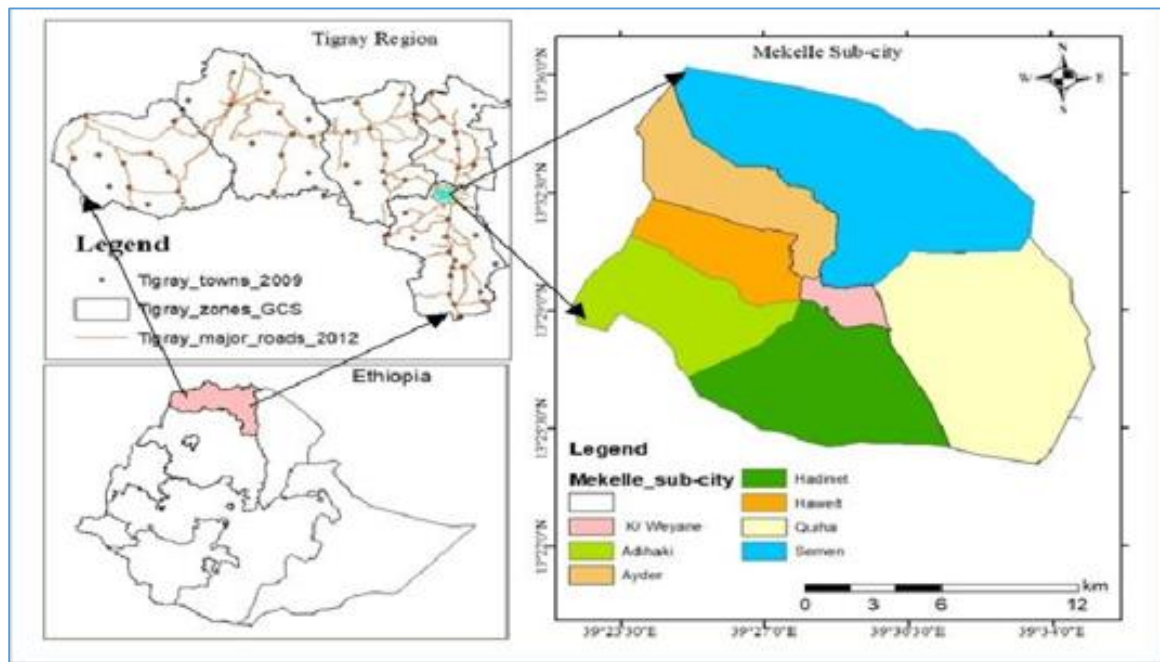


Figure 1. Location of the study area (Hagos and Gebyehu, 2023)

Study design and sample size determination

A cross-sectional study was carried out from February 2024 to July 2024 to assess the management practices and constraints of commercial layer poultry production in Mekelle City. Regarding the sample size, since the number of commercial layer poultry producers were very few, a sample size of seventy respondents (N=70) were included in this study.

Sampling technique and data collection

In this study, a purposive sampling technique was employed where individuals who were engaged in small-scale, medium-scale and large-scale commercial layer poultry

production were selected purposively for data collection from six sub cities of Mekelle City: Quiha (n=11), Hadinet (n=11), Adihaki (n=6), Hawelti (n=21), Semien (n=11) and Ayder (n=10). A structured and semi-structured questionnaire was prepared and translated into the local language (Tigrigna) for ease of understanding by the respondents. Then, the selected respondents were briefed on the purpose of the study. Accordingly, qualitative and quantitative primary data on feeding, housing, health, production performances, marketing of chicken and chicken products and challenges were collected by face-to-face interview and

personal observation.

Data management and analysis

The collected raw data were entered into an Excel sheet; cleaned, coded, imported and analyzed using a Statistical Package for Social Sciences (SPSS) version 20 (2018). Accordingly, descriptive statistical analysis was conducted to compute frequency and percentages for the qualitative data. A Chi-Square test was used to see any associations between the dependent and independent variables. A p-value of <0.05 was considered as a statistically significant association.

Results

Respondents demography and socio-economic characteristics

Results of the study have shown that, 51.4% of the respondents were male headed, and 45.7% of them were in the productive age range (31-40 years old). Livestock were found to be the major source of income for 71.4% of the respondents. It was revealed that, 47.1% of the respondents had diploma and above, and 31.4% of them had less than one year of poultry keeping experience (Table 1).

Table 1. Respondents' demography and socio-economic characteristics

Variables	Category	Frequency	Percent
sex	Male	36	51.4
	Female	34	48.6
Age	<20	1	1.4
	20-30	31	44.3
	31-40	32	45.7
	41-50	4	5.7
	>50	2	2.9
Occupation	Farmer	29	41.4
	Civil servant	6	8.6
	Merchant	7	10.0
	More than one type of work	28	40.0
Marital status	Married	58	82.9
	Single	12	17.1
	Divorced	0	0.0
	Widow	0	0.0
	Widower	0	0.0
Major Source of income	Livestock	50	71.4
	Other	20	28.6
Respondents' educational status	Illiterate	2	2.9
	Primary School	16	22.9
	Secondary School	18	25.7
	Certificate	1	1.4
	Diploma and above	33	47.1
Respondents' poultry keeping experience	< 5years	54	77.1
	5-10years	14	20.0
	>10years	2	2.9

Respondents' proportion in relation to sub city

Figure 2 below shows proportion of the respondents per the six sub cities of the study area, and majority (30%) of them were from Hawelti sub city.

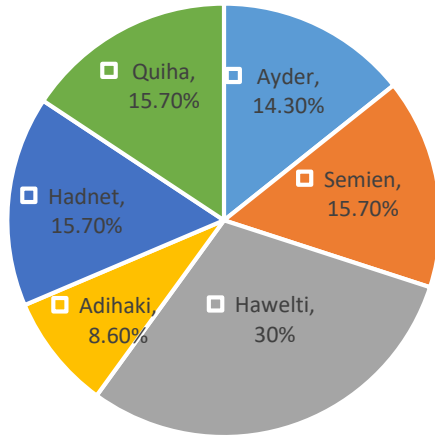


Figure 22. Respondents proportion in relation to sub city classification

Number and breed type of chickens owned and purpose of production

Respondents of this study (72.9%) were owned 100-500 chicken flock size, and 100%

of the chickens were Bovans Brown strain, and 88.5% of the respondents were kept chickens for egg production purpose (Table 2).

Table 2. Flock size, strain of chickens owned and purpose of production

Variables	Category	Frequency	Percent
Strain of chickens	Bovans Brown	70	100
Purpose of keeping chickens	Only for egg production purpose	62	88.5
	For egg production and sell chickens	8	11.4
Flock size	<100	6	8.6
	100-500	51	72.9
	501-1000	10	14.3
	1001-1500	2	2.9
	>1500	1	1.4

Feeding management of chickens

Majority of the respondents (97.1%) fed their chickens with commercial balanced feed, and 62.9% of them provide about 120g of feed

per chicken per day (Table 3).

Table 3. Feeding management of chickens

Variables	Category	Frequency	Percent
Type of feed used	Commercial balanced feed	68	97.1
	Partially commercial and homemade feed	2	2.9
Providing standard amount of feed	Yes	44	62.9
	No	26	37.1
Feeding Frequency per day	Once	1	1.4
	Twice	4	5.7
	Three times	65	92.9
Mineral supplementation	Yes	54	77.1
	No	16	22.9
Vitamin supplementation	Yes	53	75.7
	No	17	24.3
Green feed supplementation	Yes	27	38.6
	No	43	61.4
Use of modern feeders	Yes	70	100
Use of modern drinkers	Yes	70	100

Health management of Commercial Layer Chickens

Diseases prevalence was reported by 67.1% of the respondents, and chicken mortality was also reported by 54.3% respondents. Moreover,

75.7% of the respondents did not use traditional medicines to treat diseased chickens. This study has also shown that, 91.4% of the respondents vaccinate their chickens against various types of diseases (Table 4).

Table 4. Health management of chickens

Variables	Category	Frequency	Percent
Occurrence of diseases in chickens	Yes	47	67.1
Occurrence of chicken death	Yes	38	54.3
	No	32	45.7
Measures taken when chickens are diseased	I treat them by myself	20	28.6
	I consult Veterinarians	27	38.6
Use of ethno veterinary practices	Yes	17	24.3
	No	53	75.7
Vaccination of chickens/ flock	Yes	64	91.4
	No	6	8.6

Housing management of chickens

According to this study, 98.6% of the respondents reported they use a deep liter system. Based on the personal observation, 61.4% of the poultry

houses did not have good ventilation, and fumigation of the poultry houses was carried out by 88.6% of the respondents (Table 5).

Table 5. Housing management of chickens

Variable	Category	Frequency	Percent
Type of the poultry house	Floor/deep litter system	69	98.6
	age system	1	1.4
Presence of good ventilation	Yes	27	38.6
	No	43	61.4
Floor type of poultry house	Cement concrete	65	92.9
	Ground floor	5	7.1
Cleaning frequency per year	Once	1	1.4
	Three times	36	51.4
	>3 times	33	47.1
Fumigation of the poultry house	Yes	62	88.6
	No	8	11.4

Source, production performance and marketing of chickens and chicken products

The average age at first egg laying is from 4.5 to 5 months. Egg laying

percentage of 71% to 90% was reported by 58.6% of the respondents. Moreover, 87.1% of the respondents sold their eggs both on farm and off farm. (Table 6).

Table 6. Source, production performance and marketing of chickens and chicken products

Variables	Category	Frequency	Percent
Source of chickens	From chicken multiplication center	25	35.7
	From merchants	36	51.4
	From chicken multiplication center and merchants		
	Others	6	8.6
Average age at first egg laying	4.5-5 months	56	80
	>5months	14	20
Egg laying percentage	<50%	2	2.9
	50-70%	26	37.1
	71-90%	41	58.6

	>90%	1	1.4
Egg market place	On farm	9	12.9
	On farm and off farm	61	87.1
Egg customers	Traders	10	14.3
	Traders and individual customers	60	85.7

Association of dependent and independent variables

According to the Chi-Square test result, a statistically significant association ($p < 0.05$) was found between the respondents' level of education and the daily amount of feed given per

chicken per day (Table 7). Moreover, a statistically significant association ($P < 0.05$) was found between the respondents' farming experience their knowledge on poultry farm biosecurity (Table 8).

Table 7. Association between respondents' level of education and providing standard amount of feed

Variables	Categories	Providing standard amount feed		χ^2	P-value
		Yes	no		
Level of education	Lack of formal education	2(4.5%)	0(0%)	10.17	0.038
	Primary School	12(27.3%)	4(15.4%)		
	Secondary School	6(13.6%)	12(46.2%)		
	Certificate	1(2.3%)	0(0%)		
	Diploma and above	23(52.3%)	10(38.5%)		

Key: *Certificate level of education describes for those who have completed secondary school education and certified with short-term trainings.*

Table 8. Association between respondents' farming experience and their knowledge on poultry biosecurity

Variables	Categories	Knowledge of biosecurity		χ^2	P-value
		yes	No		
Farming experience	<2year	13(22.8%)	9(69.2%)	11.70	0.020
	2-3 years	13(22.8%)	2(15.4%)		
	3-5years	115(26.3%)	2(15.4%)		
	5-10 years	14(24.6%)	0(0%)		
	>10years	1.6 (3.5%)	0.4(0%)		

Major constraints in commercial layer

chicken production

The respondents were asked to rank seven lists of major constraints facing them by giving ranks from first to seventh. Accordingly, lack of credit services, feed

shortage and high cost and lack of training services were ranked from first to third ranks, respectively (Table 9).

Table 9. Rank of major constraints in commercial layer chicken production

SN	List of constraints	n	Scores (%)							Rank
			1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	
1	Lack of credit services	70	37.1	35.7	7.1	15.7	4.3	0	0	1 st
2	Feed shortage and high cost	70	32.9	54.3	11.4	1.4	0	0	0	2 nd
3	Lack of training services	70	1.4	0	54.3	31.4	12.9	0	0	3 rd
4	Disease prevalence and lack of Veterinary Services	70	5.7	7.1	22.9	51.4	12.9	0	0	4 th
5	Lack of farming land	70	22.9	2.9	4.3	1.4	62.9	5.7	0	5 th
6	Lack farm equipment	70	0	0	0	0	0	92.9	0	6 th
7	Lack of market for eggs	70	0	0	0	0	0	0	100	7 th

Discussion

In the current study area, males' proportion were higher than females'. Similar results were reported by Melkamu (2017), that the majority (83.7%) of the farms were run by males in Debre-Markos town of the Amhara region. It was also found that, majority of the respondents were in the productive age group (20-40 years). This is also consistent with the report of Tesfaye (2008), who found that the majority of the farm owners (60.8%) were in the age range between 16-60 years old in a study conducted at Metema district of Amhara region. This indicates that farm owners in the productive age group were higher than that of the non-productive age groups having labor to utilize for different farm activities. It was revealed that, 71.4% of the respondents were absolutely dependent on commercial layer poultry production as a source of their income. This finding coincides with the report of Melkamu (2017), who reported the income source for 79.6% of the poultry

producers was fully dependent on poultry production in a study conducted in and around Debre Markos in small scale commercial poultry farms.

The provision of balanced layer poultry feed is of paramount importance mainly in commercial poultry production. This study has shown that, 97.1% of the respondents feed their chickens with pure commercial balanced feed. This finding is higher than the report of Tadesse *et al.* (2017) who reported 61.5% of the poultry producers used commercial feed while the remaining 38.5% used home-made feed by their own.

Respondents of this study (92.9%) fed their chickens three times per day. Feeding frequency has direct effect on egg productivity performance of layer chickens and reveal improved egg productivity in thrice feeding than twice and once. Tadesse *et al.* (2017) found that, chicken farms fed three times per day had higher egg laying percentage (70.17%) followed by twice (48.63%) and once (42.4%) in a study conducted

at selected farms found in Mekelle, Adigrat and Southern of Tigray.

Lack of credit service ranked as first constraint, and a similar result was reported by Mengistu (2008) who noted that shortage of capital was one of the leading constraints among others in and around Debrezeit in Ethiopia. The result was also in agreement with the report of Okoli *et al.* (2005), who noted that to run small scale commercial poultry production, high cost of production inputs and lack of adequate finance were major constraints to the business in Nigeria.

Conclusion and recommendations

Lack of access to credit services, high cost of feed and lack of training are among the major challenges for the poultry farmers. Majority of the respondents provide standard amount of feed per chicken per day. The ventilation condition for majority of the poultry houses was not good, and prevalence of poultry diseases was reported by majority of the respondents. Therefore, the intervention of governmental and non-governmental organizations in providing credit services, poultry feeds, trainings on health, housing and feeding management of chickens is a paramount importance to alleviate the existing challenges in the poultry production sector.

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Conflict of interest

The authors declared no conflict of interest.

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