

## Assessment of Chicken Feed, Feeding Management and Chicken Productivity in Intensive Poultry Farms at Selected Farms of Three Zones in Tigray Region

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### Abstract

The study was conducted from November 2016 to July 2017 in Mekelle, Adigrat and Southern zone (Alamata and Maychew), Tigray region, Ethiopia with the objective of assessing chicken feed, feeding management and chicken productivity. A cross sectional study using semi structured questionnaire survey and direct observation on feed (quality, formulation), feeding management (amount of feed given per chicken per day, frequency of daily feeding and type of feed transport used) and chicken productivity performance (eggs/chicken/day) was employed in a total of 31 intensive chicken farms. The collected data were analyzed using descriptive statistics, two sided t-test and one-way analysis of variance. Knowledge on raw material selection, feed formulation, quantity of feed given/ chicken/day, frequency of feeding and cost of feed transportation are the main encountered factors by intensive chicken farmers and all revealed statistically significant effect ( $P < 0.05$ ) on productivity of chicken in terms of egg production. Therefore, for successful chicken production, increase their productivity and assure food security as whole; there is a need to establish chicken feed processing plants, improve feed related constraints and train farmers on feed and feeding management of the chicken.

**Keywords:** Chicken feed; Feeding management; Chicken productivity

### Introduction

In Ethiopia, agriculture contributes 40-50% of the gross domestic product (GDP), over 90% of the foreign exchange earnings and about 85-90% of employment opportunities in the country [1]. The majority of agricultural output is generated from crop and livestock integrated production systems. The livestock subsector contributes about 16.5% of the national Gross Domestic Product (GDP) and 35.6% of the agricultural GDP [2].

Ethiopia is a home for many livestock species and suitable for livestock production. It is believed to have the largest livestock population in Africa. An estimate indicates that the country is a home for about 56.7 million cattle, 29.33 million sheep, 29.11 goats, 56.87 million poultry, 2.03 million horses, 7.43 million donkeys, 0.4 million mules and 1.16 million camels [3].

In Ethiopia poultry production is an important part of the mixed crop-livestock farming system practiced by most households where it makes a vital function through the provision of meat and eggs for home consumption and for the generation of cash income through market exchange [4]. The sector in the country 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 village or backyard, small scale commercial and large scale commercial poultry production system [5].

Animal production in general and poultry production in particular plays important socioeconomic roles in developing countries. The ability of poultry to adapt to most areas of the world, their rapid

growth rate, fast reproduction rate compared to most other livestock or the rapid generation time, a simple means of generating family income and employment opportunities raised with relatively low capital investment and readily available household labor compared to other domestic animals all make poultry an ideal starting point for beginning production and for family use as a rich source of animal food for human being [6].

In Ethiopia there is huge demand of poultry meat and eggs which has led to an emerging establishment and expansion of modern and organized poultry farms in the entire country particularly in peri-urban and urban areas [7]. These emerging farms have vital contribution to improve the livelihood, food security and poverty reduction as well as providing a handsome return in peri-urban and urban areas in the tropics [8].

The demand of protein food is progressively growing with the improvements of society's income and population growth. To fulfill the protein requirements of the people, animal sources play a significant role. Poultry meat and egg are important sources of edible animal protein [9]. Moreover, poultry production is considered as a fulfilling nutritional requirement of the poorest sections of the society [10]. Thus, if food self-sufficiency is to be achieved and to combat malnutrition in developing countries particularly in Ethiopia, there is a need to give due attention to poultry production [11].

Factors affecting chicken under intensive production systems are numerous. However, feed, marketing constraints, diseases and biosecurity are the most important one [12]. Feed is a critical input for chicken production and account 60-70% of production costs under intensive production systems [13]. Poultry feed is one of the most critical constraints to poultry production under both the rural small

holder and large-scale systems in Ethiopia. The problem is mainly associated with lack of processing facilities, inconsistent availability and distribution and sub-standard quality of processed feeds when available [14]. In addition, smallholder farmers from different corners of the country have limited access to the formulated rations and when available, purchase it with its high cost and transportation expenditure. This makes the sector poor in production [15]. Moreover, there are also several factors which can affect the expected production of chickens. Among others, lack of knowledge on chicken feed and feeding management is the most critical factor hindering chicken productivity leading to low production level of the sector [16]. Therefore, considering the above facts, the present study was designed with the objective of:

Assessing chicken feed, feeding management and productivity performance of chickens.

## Material and Methods

### Study area

The study was carried out from November 2016 to July 2017 in selected farms found in Mekelle, Adigrat and Southern Zone (Alamata and Maychew) of Tigray Ethiopia. Mekelle is the capital city of Tigray regional state, located 783 km North of Addis Ababa at 39°29' E and 13°30' N at an altitude of 2000 m a. s. l. [17]. Adigrat town is located in Tigray regional state of Ethiopia, which is situated 921 km north of Addis Ababa and 138 km from Mekelle city. It is found at 14°16'34" N latitude and 39°27'51" E longitudes and its altitude ranges from 2000 to 3000 m.a.s.l. Alamata and Maychew are growing urban centers in the southern zone of Tigray region. Alamata town is located at geographic coordinates of 12°25'09" N and 39°33'22" E and at distance of 619 km from Addis Ababa with an altitude of 1578 m.a.s.l. while the geographical position of Maychew town is 12°47'02" N and 39°32'00" E and it is located at distance of 649 km from Addis Ababa with an altitude of 2440 m.a.s.l. There are about 6, 189,848 chickens in Tigray region [3].

### Study design

A cross sectional study using semi structured questionnaire survey and direct observation on chicken feed, chicken feeding management and chicken productivity performance was conducted in a total of 31 intensive chicken farms.

### Data collection

Data was collected through prepared semi structured questionnaire survey (from primary source which mainly comprised of farm owners and workers of the farm followed by review of the available secondary data source) and direct observational study was conducted to collect data from all assessed intensive chicken farms. Finally data on chicken feed and feeding management practices followed by production performance (number of eggs) were collected using the prepared questionnaire.

### Data management and analysis

The Collected data was stored into Microsoft excel spreadsheet and analyzed using SPSS version 20. Descriptive statistics were used for describing management practices in each intensive farms. Differences in productive performances (egg) were compared using means

generated from two sided t-test and one-way analysis variance (ANOVA).

## Results

The result of the present study on 32 intensive chicken farms 61.5% used commercial feed while the remaining 38.5% used home-made feed by their own. Lack of knowledge (54.83%), unavailability of ingredients (9.677%) and cost of ingredients (35.48%) were the main constraints to prepare home-made feed (Table 1). Chickens fed with commercial feed have higher productivity performance (70.08%) than those chickens fed with home-made feed (Table 2). This study also showed that chicken farms fed three times per day have higher egg laying percentage (70.17%) followed by twice (48.63%) and once (42.4%) fed chicken farms (Table 3). Mean productivity of chicken farms was 69.41% in farms which transport feed by their own whereas farms which relied on feed manufacturers for feed transport had an average of 38.43% productivity (Table 4). 48.38% of assessed chicken farms used standard quality feed and had an average of 79.16% productivity whereas (52.62%) farms used substandard quality feed and had mean productivity of 46.72% (Table 5). Productivity of chickens fed as per daily chicken requirement was 75.65% however; chickens fed above and below daily requirement had productivity of 57.03% and 45.80% respectively (Table 6).

Variables	Number of farms	%
<b>Feed Type</b>		
Commercial feed	19	61.5
Home-made feed	12	38.5
<b>Problem of purchased/commercial feed</b>		
Price of feed	17	53.8
Unavailability in nearby area	14	46.2
<b>Problem of preparing at home</b>		
Lack of knowledge	17	54.83
Unavailability of ingredients	3	9.677
Cost of ingredients	11	35.48

**Table 1:** Merits and demerits of commercial and home prepared feed.

Type of feed	N	Productivity/Chicken farm	
		Mean%	SD
Home-made	11	48.48	8.95
Commercial	20	70.08	22.35
Total	31	62.42	22.35

**Table 2:** Type of feed and egg productivity performance. N=Number of farms; SD=Standard deviation; P-value=0.0076.

Frequency of feeding/ day	N	Productivity/Chicken farm	
		Mean%	SD

Once	4	42.4	17.17
Twice	6	48.63	10
Three times	21	70.17	21.9
Total	31	62.42	22.35

**Table 3:** Frequency of feeding and egg productivity performance. N=Number of farms; SD=Standard deviation; p-value=0.0076.

Transport	N	Productivity/Chicken farm	
		Mean%	SD
Own	24	69.41	18.7
Feed producers'	7	38.43	17.02
Total	31	62.42	22.35

**Table 4:** Type of feed transport used and egg productivity performance. N=Number of Farms; SD=Standard deviation; P-value=0.0005.

Feed Quality	N	Productivity/Chicken farm	
		Mean %	SD
Standard	15	79.16	16.92
Substandard	16	46.72	13.73
Total	31	62.42	22.35

**Table 5:** Quality of feed and egg productivity performance. N=Number of Farms; SD=Standard deviation; P-value=0.0000.

Amount of feed given/day	N	Productivity/Chicken farm	
		Mean%	SD
Below requirement	10	45.8	15.63
As per standard	15	75.65	18.6
Above requirement	6	57.03	21.84
Total	31	62.42	22.35

**Table 6:** Amount of feed given/layer chicken/day and productivity performance. N=Number of Farms; SD=Standard deviation; P-value=0.00.

## Discussion

The results of the present study indicated that, of 32 intensive chicken farms, higher proportion (61.5%) used commercial chicken feed while the remaining 38.5% used their own home-made feed. This is supported with the result of [18] who reported that most small-scale poultry farms obtain their feed from large-scale commercial farms. According to the response of chicken farmers participated in this study, most chicken farmers do not use home-mixed ration due to lack of knowledge (54.83%), cost of ingredients (35.48%) and unavailability of ingredients (9.677%) (Table 1). In agreement with the present finding, [19] has reported that although there was considerable interest

on-farm mixing of feeds, it was not practiced due to high cost of ingredients and lack of knowledge on proper feed formulation. This also coincides with the reports of [20] in Botswana, [21] and [22] in Addis Ababa who reported in common that high feed cost was the most noticeable constraint faced by small scale intensive poultry farms.

The present study revealed that commercially formulated feed had a significant effect ( $p < 0.05$ ) on productivity performance of chickens over use of home-made feed (Table 1). This agrees with the report of [23] who reported that laying chicken draws upon the nutrients provided in its diet to produce eggs. This was also in line with the report of [24] who noted that increasingly important for producers to find a balance between feeding their birds on a least-cost basis as well as feeding the appropriate amounts of nutrients in the diet as the chicken needs them throughout her laying cycle. Similarly, [25] reported that diets for laying chicken are formulated to meet the requirements that may limit egg production.

With regard to feeding frequency, the present finding revealed that majority of the farmers (69.2%) provide feed to their chicken three times per day while the remaining 9.6% and 21.2% provide once and twice per day respectively. There was statistically significant effect ( $p < 0.05$ ) among once, twice and thrice feeding frequency on egg productivity performance of layer chickens and reveal improved egg productivity in thrice feeding. This result is in line with the report of [26] who reported that productivity of the chicken could be affected by feeding frequency. At the same time the present finding is also supported by the report of [27] who indicated that twice and thrice a day feeding regimens rather than once a day improved egg production rate. The current finding also coincides with the report of [28,29] who reported that chicken fed twice a day produced more eggs compared with chicken fed once a day and the chicken received their feed 2 or 3 times per day laid 4.8 eggs more than those that fed one time per day [30]. Also indicated that feeding 3 times per day increased the percentage of chicken daily egg production.

In this study, productivity performance of chicken farms was highly affected by the type of feed transport used. 69.2% of the farmers used their own feed transport and had 69.41% productivity while the remaining 30.8% farmers used feed manufacturers' transport and had productivity of 38.43%. This revealed a statistically significant effect ( $P < 0.05$ ) on productivity performance. This report is in line with the report of [31,22] who noted that the transport costs add significantly to the cost of feed in areas distant from the source of supply. It is also in agreement with the reports of [5] who noted that transport cost of feed is one of the factors that can affect the expected production of the chicken.

The present study also revealed that feed quality has a statistically significant effect ( $P < 0.05$ ) on chicken productivity. There was 79.16% chicken productivity in 48.38% assessed chicken farms that used standard quality feed however, chicken productivity in the remaining farms that used substandard quality feed was 46.72%. This is in agreement with the report of [32] who reported that quality of feed provided as a main factor for egg productivity of the chicken. It is also in line with the report of [5] who reported that the quality of mixed feed for commercial poultry production is generally poor in Ethiopia which can affect the expected production of the chicken.

In this study, amount of feed given per chicken per day has a significant effect ( $P < 0.05$ ) on chicken productivity. 32.25%, 19.35% and 48.38% chicken farms provided feed below, above and as per daily feed requirement of the chicken and had productivity of 45.80%, 57.03%

and 75.65% productivity respectively. This coincides with the report of [33] who reported that over or under feeding has been shown to negatively impact on egg production.

## Conclusion and Recommendations

The result of the current study reveal feed related constraints in intensive chicken production systems; suggesting productivity could be increased through improved feeding and feeding managements. Poultry production is a progressively growing sector worldwide and Chickens are the only species that can be expected to be found in every poor household, serving as protein food sources and an income in Ethiopia. However, an issue with chicken feed and feeding management is becoming a real factor contributing to the low performance of chicken production in the study areas. Lack of knowledge on feed formulation, ingredient selection, amount of feed given per chicken per day, frequency of feeding and cost of transportation were the main encountered factors by intensive chicken farmers and reveal significant effect on the productivity performance of chicken in terms of egg production.

Based on the above conclusion the following recommendations are forwarded:

Government and private investors should participate in the establishment of poultry feed processing plants so as to provide a feed with a standard quality and a minimum price.

Chicken farm owners, managers and workers should be trained on nutritional characteristics of locally available chicken feed, feed formulation and feeding management.

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