

**UNIVERSITY OF GHANA**



**COLLEGE OF HUMANITIES**

**FACTORS INFLUENCING THE PERFORMANCE OF SMALL AND  
MEDIUM SCALE ENTERPRISES (SMEs): A CASE STUDY OF DORMAA  
POULTRY FARMERS**

**BY**

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## DECLARATION

I hereby declare that, with the exception of the references duly cited, this thesis: Factors Influencing the Performance of Small and Medium Scale Enterprises (SMEs): A Case Study Of Dormaa Poultry Farmers is a result of my own research carried out at the Department of Economics, University of Ghana and this work has not been presented to this University or elsewhere, either in part or full for any other degree.



DR. YAW ASANTE

PROF. A. BAAH-NUAKOH

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## ABSTRACT

Interest in the role of SMEs in the development process continues to be at the forefront of policy debates in developing countries. The role of SMEs is crucial in the development process of many countries especially developing ones. About eighty percent of commercial poultry producers operate at small and medium scale levels with few large-scale activities in Ghana. Poultry production is one of the major agricultural activities in the Brong Ahafo Region of Ghana dominating in terms of the total poultry flocks as well as the production of broiler meat in the country. One district that has played a crucial role in this achievement is the Dormaa Municipality. The performance of this sector could boost the growth of the country through employment creation, meat and egg production, income generation among others. The experience of managers, level of education of managers, age of firm, size of firm, access to finance, extension contact among others have been viewed as critical elements that affect the performance of the poultry SMEs. Therefore, this study sought to evaluate the factors affecting the performance of SMEs by specifically focusing on the Dormaa Poultry farmers located in the Dormaa Municipality. The specific objectives were to; investigate the factors that influenced the performance of poultry farmers, examine whether there exist disparities in performance on the grounds of gender, formalization and association membership and the source of such disparities if they are established to be existing. The study used a secondary microeconomic panel data comprising of 155 farmers located in the cluster area. Descriptive statistics such as means, variations and demographic characteristics of the data were analysed and presented. The Pooled OLS and the Within Effect estimator were used to determine the factors that affected the performance of poultry farm in the Municipality. Weekly sales was adopted as a proxy for performance. The results from the two models revealed a significantly positive relation between association membership and performance. Also, size, as well as formalization of farms, had a positive relation with performance. However, there existed a negative relation between the level of education of managers and performance. In order to achieve the second and third objectives, the Blinder-Oaxaca decomposition was employed. The results showed that there existed some form of discrimination coming from Association membership and formalization flowing from the unexplained components. There wasn't any support for gender discrimination. The study recommends policies aimed at persuading farmers to join membership organizations and encourage the registration of farms to enjoy the benefits and advantages resulting from such affiliations and formalization status.

## **DEDICATION**

This thesis is dedicated to the Almighty God and to all my loved ones especially my parents: Mr. and Mrs. Sarpong, my only sister Linda Sarpong and Husband not forgetting my nieces Akua Akyamaa Acheampong and Nana Yaa Afrakoma Acheampong. Also, I dedicate this work to everyone who through their prayers and words of encouragement have enabled me to chalk this success.



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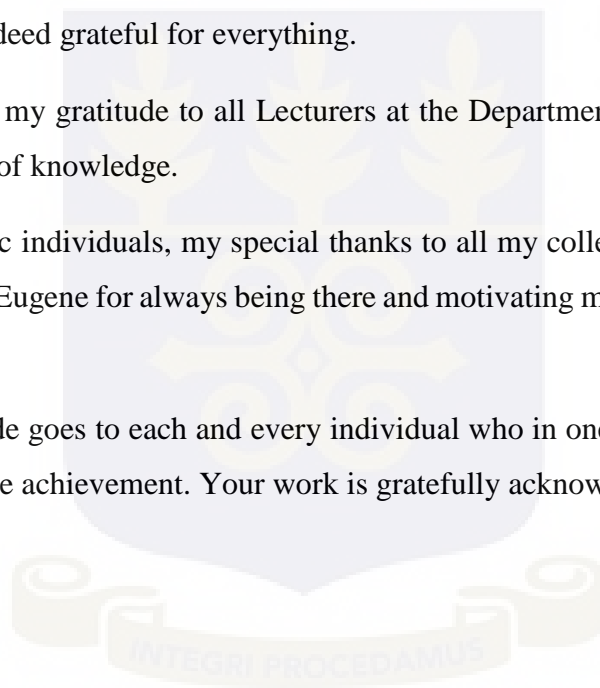
Secondly, I wish to express my deep and humble appreciation to my supervisors; Dr. Yaw Asante and Prof. A. Baah-Nuakoh for their guidance, patience, criticisms and immense contributions made to this study. I pray that the Almighty God will continue to grant you good health and long life to continue with your good work.

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With reference to specific individuals, my special thanks to all my colleagues in the Department of Economics especially Eugene for always being there and motivating me even when the situation looked bleak.

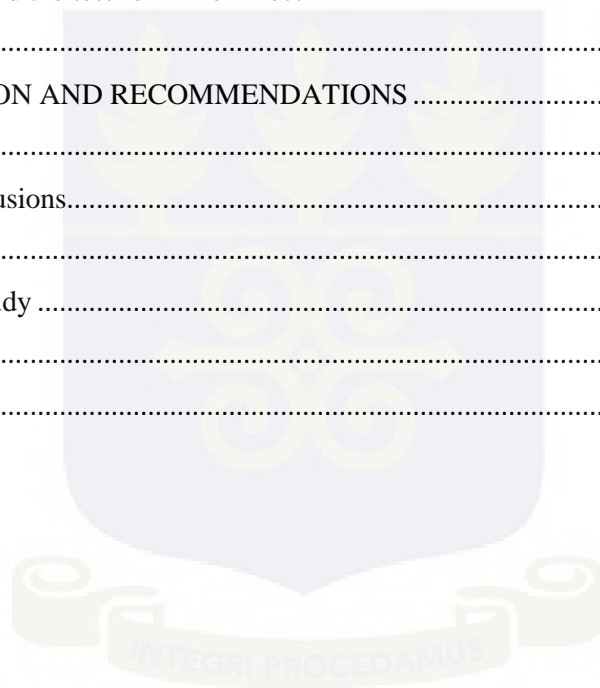
Finally, a debt of gratitude goes to each and every individual who in one way or the other had an influence on this immense achievement. Your work is gratefully acknowledged.



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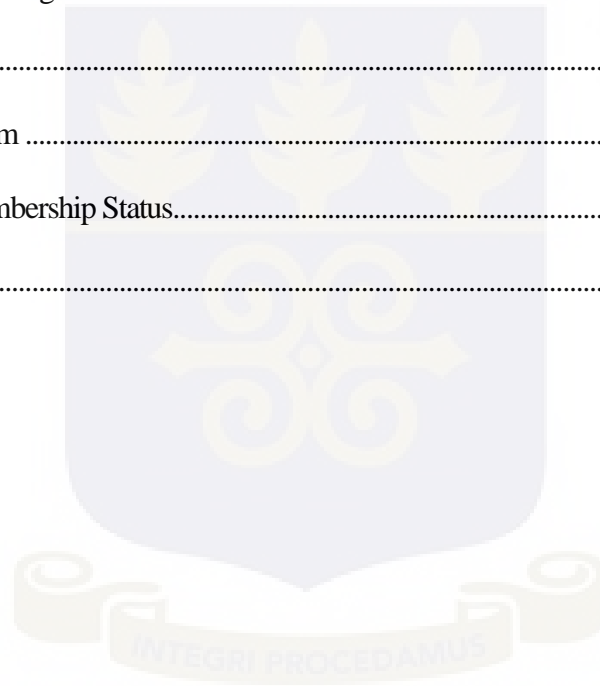
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## LIST OF ABBREVIATIONS AND ACRONYMS

BE	-	Between Effect Model
CES	-	Constant Elasticity of Substitution.
C-D	-	Cobb-Douglas
DOC	-	Day Old Chick
DPFA	-	Dormaa Poultry Farmers' Association
EDAIF	-	Export Development and Agriculture Investment Fund
FAO	-	Food and Agriculture Organization
FASDEP	-	Food and Agriculture Sector Development Policy
FE	-	Fixed Effect Model
GoG	-	Government of Ghana
GSS	-	Ghana Statistical Service
HACCP	-	Hazard Critical Control Point
HPAI H5N1	-	Highly Pathogenic Asian Avian Influenza A
IOM	-	International Organization for Migration
MDBS	-	Multi Donor Budgetary Support
METASIP	-	Medium Term Agriculture Sector Investment Plan
MOFA	-	Ministry of Food and Agriculture
MoF	-	Ministry of Finance
MRW	-	Mankiw Romer Weil
MT	-	Metric Tonne
NAFC	-	National Food Buffer Stock Company
OLS	-	Ordinary Least Square
RE	-	Random Effect Model
SME	-	Small and Medium Scale Enterprise
TRS	-	Technical Rate of Substitution
UNIDO	-	United Nations Industrial Development Organization

- USDA - United State Department of Agriculture
- VES - Variable Elasticity of Substitution
- VSD - Veterinary Service Directorate



## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background**

The study of the history of economic development proposed by Rostow has revealed that the promotion of infant industries is one of the major drivers behind the success stories of industrialization in Europe (Rostow, 1960). As a result, Small and Medium Scale Enterprises (SMEs) have assumed a significant role in the social and economic development of many countries (UNDP, 2000). The SMEs are a vital ingredient in the sustainable development of developing economies (Mudavanhu et. al., 2011). SMEs exist in all sectors of the economy.

Ghana's growth in the poultry sector has attracted attention and investment in recent times. The period between the 1970s and 1980s was a kind of golden age when investments were made, commercial producers performed well and the country was nearly self-sufficient in chicken meat and eggs (Sumberg et al., 2013). However, the liberalization in the early 1980s coupled with the opening of the economy to international trade agreements through Ghana's participation in international organizations (such as WTO in 1995) have exposed Ghana's markets to "dumping" and "flooding" of subsidized imports of cheaper frozen chicken. Ghana is bound by the Agreement on Agriculture (AoA) which was negotiated in the 1986-1994 Uruguay Round as a result of its participation as a member of the World Trade Organization (WTO).

Whether coincidental or by planned design, the liberalization by the Breton Woods institution has created a very suitable atmosphere to the European Union members to increase the export of their product particularly poultry at a lower tariff of 20% since 1992. For instance around the same period (i.e. the 1980s and 1990s), tariffs on agricultural products specifically poultry, tomato, and rice were drastically reduced. Asuming-Brempong et al. (2006) report that from the period between

1998 and 2004, imports of poultry products increased from 4,000MT to 40,000MT, with chicken thighs making up between 50 and 90 percent of the total imports.

This notwithstanding, the poultry sector in Ghana presents promising avenues for investment opportunities and as a result has led to the springing up of small and medium scale enterprises engaging in poultry activities. Flake and Ashitey (2008) noted that eighty percent (80%) of commercial poultry producers operate at the small and medium scale levels in Ghana. It is, therefore, important to delve deeper into the poultry SMEs since it is a potential avenue for employment creation, revenue generation and ultimately economic growth. As a result of these and many other reasons, it has necessitated this thesis to investigate the factors affecting the performance of SMEs in Ghana and particularly Dormaa poultry farmers.

Livestock production, specifically poultry production, is one of the major activities in the Brong Ahafo Region. The region was ranked first in terms of the number of poultry flocks produced as can be observed in Appendix 1 (FAO, 2014). The total number of birds produced in the year 2009 was a little less than 11 million making up almost 30% of the national output followed closely by Ashanti Region with a total number of about 10 million birds constituting 28% of the national output (VSD, 2010). Again in 2009, the Region recorded the highest broiler meat production (VSD, 2009). One municipality that champions the production of poultry in the region is Dormaa Ahenkro as can be observed from Figure 2 in the succeeding chapter. The district dominates in terms of the number of farms with a total number of two hundred and two farms. Sunyani West and Central follow with ninety and sixty-five farms respectively. The facts presented suggest that it is not wrong to use such a cluster (Dormaa Ahenkro) since it is one of the best performing poultry clusters in Ghana (FAO, 2014) and can serve as a critical case study and the findings can be used to inform other clusters in the country (Flyvbjerg, 2006).

## 1.2 Statement of the Problem

Small and Medium enterprises play an important role in the development of developing countries. Wolfenson (2001) advances that small enterprises have the potential of lifting countries out of poverty and as a result form an integral part of economic development. Abor and Quartey (2010) have also argued that SMEs are a major driving force of employment creation in many developing countries due to their nature. They put forth two important observations: First, SMEs are labour intensive in nature and hence provide employment opportunities to a lot of people. Secondly, SMEs represent about 92% of Ghanaian businesses and contribute about 70% to Ghana's GDP and over 80% to employment. In South Africa, they make up 91% of formalized businesses whereas in Nigeria they constitute 70% of the manufacturing sector. SMEs do not only contribute to GDP but also provide interesting avenues for expanding outside of domestic borders and entering intra-regional and international markets. SMEs are now exposed to greater opportunities than ever before as expansion and diversification across different sectors continue (PWC, 2013).

The poultry industry in Ghana is gradually emerging as one of the powerhouses in terms of small and medium enterprises that contribute to the growth of the country through employment creation, meat and egg production, income generation among others. They as well provide feeder service to large-scale industries (Fabayo, 2009). The continuous growth and success of this sector promises a brighter and blissful future for the economy. The data from the veterinary services directorate demonstrate that the Brong Ahafo Region of the country is one of the dominant regions in terms of poultry production.

Despite the contribution of SMEs to the nation's GDP, most of them fail along the way. In 2005, ILO reported that starting a business was a risky venture and that there was a slim chance for a small-business enterprise to surpass five years of commencing the business. It is even worse for

developing countries such as Ghana as Marlow and McAdam (2009) advances that the probability of small and medium scale businesses surviving in developing countries is lower than that of developed ones. Various research works on survival analysis have supported this claim. These survival analyses do not isolate the poultry sector. Many poultry farmers have failed and as a result, have exited the market. Akabueze (2002) identifies such factors that lead to the failure of these SMEs as the lack of financial resources, lack of management experience, poor location, laws and regulations, general economic conditions, poor infrastructure, corruption, low demand for products and services and many others.

Notwithstanding the many factors that result in the failure of some SMEs, there are others that have successfully overcome these obstacles and performed tremendously. It is therefore, of interest to academics, policy makers, practitioners and industry professionals to determine what factors contribute to the success of such SMEs. The government of Ghana with adequate knowledge of this sector can give some support to stakeholders under its one district one factory flagship program to boost employment in the study area. The principal aim of this thesis is to investigate the factors that influence the performance of SMEs, particularly Dormaa Poultry Farmers.

### **1.3 Objective of the Study**

The fact that the success rate of SMEs in especially developing countries is low (ILO report) makes it more important to investigate the factors that lead to the “better performance” of those still in operation. Narrowing it down to the Poultry sector of the economy, this thesis will investigate as its primary objective the factors that determine the performance of Dormaa Poultry farmers. Specifically, the objectives of this thesis are to:

1. Determine the factors that affect the performance of Dormaa Poultry Farmers.

2. Examine whether there exist disparities in performance on the grounds of Gender, Formalization, and Association Membership status.
3. If such disparities exist, where are they emanating from?

#### **1.4 Significance of the Study**

The performance of this sector is critical to the development and growth of the country at large. Poultry production is one of the major activities in the Dormaa municipality. The performance of this industry has the potential of creating employment in the sub-region to curb the high rate of perilous migration. Reports from International Organization for Migration (IOM) indicate that majority of the youth that migrates through the desert to seek for greener pastures in Europe originates from the study area<sup>1</sup>. Acheampong (2015) advances that poultry SMEs located in Dormaa employs approximately 1,500 persons in the district. Again high sales performance will generate tax revenue for the government as well as add up to the nation's GDP. It will as well lead to the springing up of subsidiary industries and also provide feeder services to large-scale industries (Fabayo, 2009).

#### **1.5 Organization of the Thesis**

This thesis is categorized into five chapters: The first chapter introduces the study, the second chapter reviews literature on relevant topics on the study of the performance of poultry and empirical studies that focused on performance of the poultry sector and SMEs at large, the third chapter discusses the methodology employed in the study, chapter four discusses the results of the

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<sup>1</sup> <http://www.iom.int/files/live/sites/iom/files/Country/docs/IOM-Ghana-raises-concern-about-Ghanaian-youth-embarking-on-perilous-journeys.html>

study, and the final chapter presents summary, conclusion, limitations, and recommendations based on the findings of the research.



## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter covers a wide range of sub-sections ranging from definition of terms to the review of related literature. It begins with a context based and internationally accepted definitions for some of the terminologies adopted in this study. An overview of the Ghanaian poultry sector is given to capture the trends and evolution as well as some of the potentials and challenges facing the poultry sector in Ghana. The chapter also reviews theories underpinning the topic of discussion – theory of production. A summary review of related works that are of essence to this study are captured in the final section of this chapter.

#### **2.2 Definition of Concepts**

##### **2.2.1 Small and Medium Scale Enterprises (SMEs)**

The definition of the word SME is as complicated as the sector itself (Senderovitz, 2009). There is no single criterion for classifying business enterprises as small or medium scale globally and as a result there are numerous definitions and classifications for SMEs. The National Board for Small Scale Industries define SMEs as “any business employing twenty nine (29) or fewer workers”. UNIDO’s Definition for Developing Countries classifies a large enterprise as one with over 100 workers, medium with 20 to 99 workers and small with 5 to 19 workers (Acheampong, 2015). In 2005, International labour Organization carried out a study that identified over 50 definitions for SMEs for 75 different countries. This points out the complexity of having a standard definition for SMEs. In order to avoid the definitional debates and complications in defining SMEs, the study focuses on a context-based definition that has been used by many Ghanaian authors which adopts number of employees as the basis. This classification divides an enterprise into three broad

groupings: micro (enterprises having less than 6 employees), small (enterprises having less than 30 but more than 5 employees) and medium enterprises (firms with less than 99 employees but above the upper limit for small enterprises).

### **2.2.2 The Concept of Performance**

Performance seems to be conceptualised, operationalized and measured in different ways thus making cross-comparison difficult. Cooper et al. (1994) defined Performance as the act of performing; of doing something successfully; using knowledge as distinguished from merely possessing it. Among the most frequently used measures for performance are size of business (number of employees), profitability, gross revenue, and income (Lerner, Brush, and Hisrich, 1997). Brown et al. (1995) asserted that performance is predominantly measured in terms of financial performance which could be profitability, sales and market share. Other classifications have considered quantifiable measures such as number of employees, investment outlay, annual turnover, the asset value of the enterprise or a combination of these measures. Fiorito and LaForge (1986), reported that, business owners are generally reluctant to provide financial data on their enterprises. Most often private firms are unwilling to release sensitive data such as their net income or return on investment. Stanger (2000) used sales to measure performance; the writer termed it as the most commonly reported performance indicator and one that is well defined and understood by all respondents. This study as well examines performance and as a result uses weekly sales as the variable of interest. This can also serve as a proxy for gross revenue and partly income of Poultry farmers which measures performance as prescribed by Lerner and Hisrich.

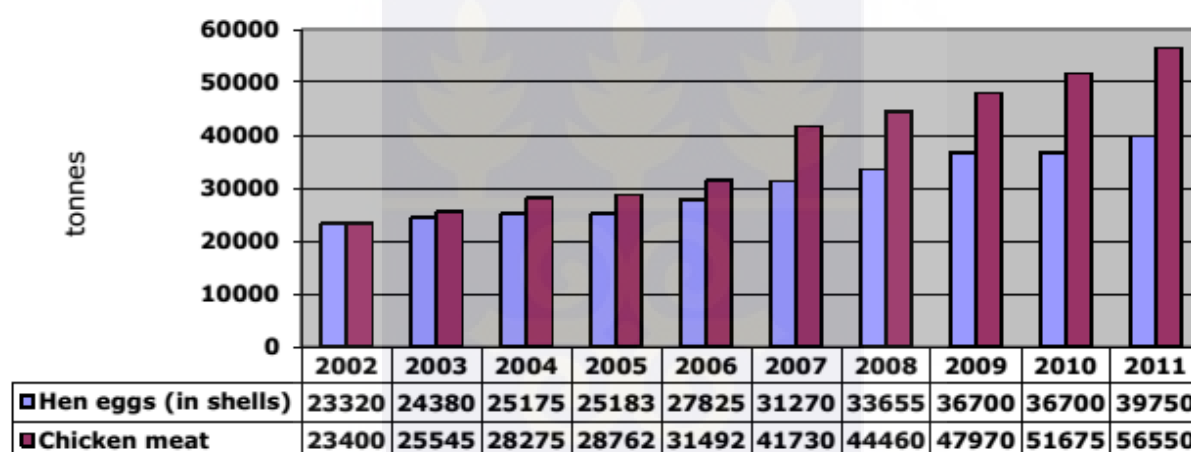
### **2.3 The Poultry Sub Sector**

The term poultry refers to all domestic fowls, which include chickens, turkeys, ducks and geese which are raised for the production of meat, eggs, feathers, or sometimes as pets. The term may also mean the flesh of these birds used for consumption or as food. Kekeoha (1984) broadly defines poultry to include all domestic chickens, turkeys, ducks, geese, quails, guinea fowls, ostriches, pigeons, pea fowls and swans that are reared for similar purposes explained earlier. However, the term poultry is usually taken by the rural farmers as well as consumers to mean chickens because they are reared more often than any other kind of poultry. In poultry markets, male chickens are called roosters or cocks; females, especially those more than a year old, are called hens; females and males less than a year old are called pullets and cockerel respectively; very young chicken of either sex are called chicks; and castrated males are called capons (Zelalem, 2008).

Over the past twenty five years the Ghanaian economy has experienced a stable growth and has been classified as one of the fastest growing economies in Africa. However, the past few years have seen a downturn. The poultry sector could play an important role in this path to growth and make a significant contribution to domestic food security (Embassy of the Kingdom of the Netherlands, 2015). A major boost in the poultry industry in Ghana occurred when the Ghana National Association of Poultry Farmers, the Ghana Feed Millers Association and Hatcheries were formed in 1984, 1985 and 1990 respectively. Ghana's poultry sector was pioneered by the establishment of commercial state poultry farms such as Pomadze Farms in the 1960's to address the shortfall of animal protein (Eshun, Agbadzem & Asante, 2014). The unavailability of inputs coupled with the outbreak of poultry diseases hindered the growth of the sector during the period. The removal of import duties on poultry in the 1970s as well as the "Operation feed yourself" programme rolled out in the same period resulted in a boost in backyard poultry farming. As a result of these interventions in the 1970s, the country could supply 95% of its poultry needs within

the periods 1980 and 1990. Then after these boom periods, the preceding decade recorded a decline in production. In the year 2000, the country could only supply 10% of its poultry needs. Ghana spent US\$ 200 million on importation of frozen chicken, which forms 4.98% of the country's GDP (Aning, 2006). However, from this period (2000) through to 2011, the production of chicken and egg have been on the rise with a significant difference between the production of layers and broilers. As can be observed from the figure below, the production of broiler birds over the years has been on the ascendency.

Figure 2.1 National production of the poultry sector (2013)



Source: FAO, 2014.

It is sad to note that only 10% of the total market demand for broilers are supplied domestically with the remaining 90% being imported from the European Union, United States and Brazil (USDA, 2013). This has been attributed to the high prices of domestic broiler meat which cannot compete with the cheaper imported ones. For example, the two main national poultry farms (Pomadze and Afariwaa Farms) folded up due to cut-throat competition from importers of frozen chicken products and lack of government support (FAO, 2006; Oppong-Apene, 2013). The United States Department of Agriculture (USDA) has as well identified other constraints as the high costs of production, limited knowledge of modern poultry keeping, inefficient production methods, lack of processing facilities and high energy prices to be constraints to the broiler industry in Ghana.

As part of the government's measures to boost the poultry industry, it resorted to the removal of customs duties on poultry inputs such as feed, drugs, additives and vaccines in 2013. The government as well facilitated improved access to veterinary services and in 2014 it launched the Broiler Revitalization Project with the aim of boosting the local production of broiler birds. As part of the policy, a cap of 60% allowable importation of chicken meat is permitted. This means that importers can only import 60% of their produce from outside the country and buy the rest domestically. The various interventions are meant to boost the sector to perform well and also create opportunities for the development of the local broiler sector.

Commercial poultry farms in Ghana currently can be identified in three regions. These are the Greater Accra, Ashanti and Brong Ahafo regions. The activities of these farms range from small to medium and to large scale poultry farming. Currently, there are less than twenty (20) large scale poultry farms (i.e. over 10,000 birds) in the country. Their main operations focus on the production of layers with limited production of broiler birds mostly during occasions such as Christmas and Easter festivities (Ibid). Such farms are mostly privately owned with their own hatcheries and feed mills and as well follow the vaccination programme recommended by the Veterinary Services Directorate of the Ministry of Food and Agriculture. Unity Farms limited and Akate Farms limited which are all previous winners of the Best National Poultry Farmer Award are examples of such large scale farms. Aside the few farms that produce on a large scale, the vast majority comprising of over 90% produce on small (50-5,000 birds) and medium scales (5,000-10,000 birds) (Ibid). Whiles the Small-scale farms mainly produce broiler birds, the Medium-scale farms focus on the production of eggs. Darko Farms limited is the only large-scale farm that exclusively produces broilers.

Much of the slaughtering of live birds in Ghana is done at the household level or at the live bird markets due to the limited slaughtering and processing facilities in the country. Some of the

formally notable abattoirs in Ghana that engage in the slaughtering of live birds include Asamoah-Yamoah, Gees Fresh Point, Aboabo, Kumasi and Domeh Fowl markets among others. Their activities range from slaughtering to whole birds dressing.

The country's poultry feed production basically focuses on layer feed due to the dominance of the production of layer birds in the industry. The main ingredients used for the production of the feed are maize, fishmeal, premix, concentrates and soybean which on most occasions are imported except locally produced white maize. From the 2014 data provided by FAO, the cost of these inputs mix have been on the rise and as a result most feed manufacturers have resorted to cheaper substitutes such as cotton-seed cake, soybean cake, copra cake, fish meal, palm kernel cake, and other by-products of agro-processing. Maize forms over 50% of poultry feed and since Ghana is self-sufficient in the production of maize, its import volumes significantly reduced by over 70% between 2011 and 2013 (Ibid). Feed mill is produced domestically as well. Notable among the producers are Agricare, Central Feed Mill, Ghana Nuts Limited and Kosher Feed Mill. However, they produce below their capacity due to the fact that most small and medium-scale farmers prefer concentrates which is relatively cheaper and easy to transport.

Hatching eggs and Day-old Chicks (DOC) are mainly imported from Brazil, the European Union and the United States. Some farms such as Akate Farms and Topman Farms have hatcheries for the production of Day-old Chicks. Aning (2006) averred that the 11 hatcheries in Ghana only operate at 38% of their total production capacity. Others like Darko, Mfun, Africo, Asayam and Afariwa farms depend on fertilized imported eggs for their production.

The control of poultry diseases is the mandate of the Veterinary Services Directorate of Ghana (VSD). The Directorate procures drugs and vaccines from recognized manufacturers who meet the standards of the World Organization of Animal Health. The drugs and vaccines are either supplied

by intermediate private veterinary drug companies to the farmers or directly to the farmers by the manufacturers. Notable among such veterinary drug companies that import drugs and vaccines include Frankatson Ltd, Multivet Ltd, Maridav Ltd, Gokals Ltd, Danex Ltd among others.

The production and consumption of poultry meat in Ghana has been increasing over the past decade. In 2012, domestic poultry meat production was 46,308 metric tonnes (36%) followed by cattle with total productivity of 21,221 (17%) (MoFA Facts and Figures, 2013). The estimated per capita consumption of poultry products in Ghana has increased by thirty-three percent from 4 kg in 2010 to 6.6 kg in 2012 (USDA, 2013). Livestock and poultry meat make up forty percent of the total animal protein consumption (USDA, 2013). The urban consumption of poultry meat is dominated by imported frozen poultry products as they are comparatively cheaper than the domestic ones. Nevertheless, generally the populace prefer the meat of domestic breed of poultry due to its better flavour and structure (Koudijs & Shyams, 2014). Darko Farms and Cottage Farms have as a result established cold stores in some selected locations in Accra that deal in the selling of frozen domestic poultry products ranging from Chicken legs to whole birds.

From the VSD census of 2010, the largest number of poultry flocks was from the Brong-Ahafo Region which accounted for 29.6 % of the total poultry population in Ghana. The distribution of poultry production farms in Ghana is spread across the entire country, nevertheless some regions dominate in its production as can be observed from the table below.

Table 2.1 Ghana Poultry Sector Statistics (2011)

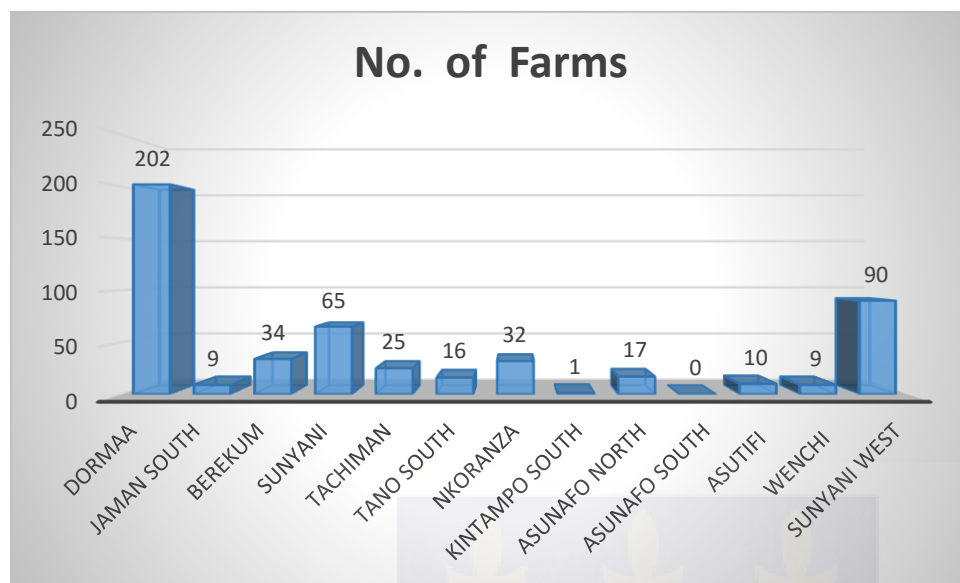
National					Brong Ahafo Region	
Region	No. of Birds	% of Birds	Egg Production (in millions)	No. of Farms	District	No. of Farms
Greater Accra	2,547,219	7.02%	542	475	Dormaa	202
Central	903,702	2.49%	437	312	Jaman South	9
Western	1,406,642	3.88%	247	102	Berekum	34
Eastern	3,886,914	10.72%	358	213	Sunyani	65
Volta	1,071,622	2.95%	68	98	Tachiman	25
Ashanti	10,180,760	28.07%	5,321	697	Tano South	16
Brong Ahafo	10,743,897	29.62%	3,989	510	Nkoranza	32
Northern	3,625,149	9.99%	-	30	Kintampo South	1
Upper East	1,325,835	3.66%	-	33	Asunafo North	17
Upper West	579,474	1.60%	-	34	Asunafo South	0
					Asutifi	10
					Wenchi	9
					Sunyani West	90

+Based on FAO Sector 1/2/3 Classification

Sources: Veterinary Services Directorate in FAO, 2014.

The Brong Ahafo and Ashanti Regions are the two dominant forces in terms of the production of birds (poultry) in the country. The two regions contribute more than fifty percent (50%) of the country's poultry production. The two regions as well as the Greater Accra region dominate in the production of eggs and the number of farms as can be observed from the table above.

Figure 2.2 District distribution of poultry farms



Source: Author's compilation based on the evidence from Veterinary Services Directorate (2001).

It can as well be observed from Figure 2.2 that, in terms of the regional distribution, the Dormaa municipality dominates in the production of poultry and this has necessitated the usage of this cluster for the study as already indicated.

### **Problems facing the Poultry Industry**

Just as with every business, there are challenges that characterize their activities. The poultry sector is no exception to this menace. Several problems hinder the smooth operations of their activities.

Some of the challenges have been identified under this sub-section.

- **High Cost of Feed**

One problem that many small and medium scale poultry farmers face is the high cost and poor quality of feed ingredients. From the period between the 1980s and 2000s, the total number of feed mills reduced from 33 to only 10 (VSD, 2013). This reduction in the number of feed mills led to excess demand which in turn caused an upward hike in the price of feed. Aside the reduction in

their number, most feed millers are producing below their capacity. They produce about 40 to 50 percent of their capacity which further reduces the quantity they produce (GRAIN Report, 2013). This suggests that small and medium scale poultry farmers who depend mainly on feed millers will face a challenge in having access due to this constraint in the quantity of feed produced. The quality of feed mill produced is also questioned since the millers are not guided or regulated by control systems of quality standards and regulations for sample testing of feed.

- **Poor Quality Day-Old Chicks**

Local production of day-old chicks is one major challenge facing the poultry industry. Similarly with the feed millers, local hatcheries are not regulated by any control systems of quality standards and as a result, poor quality day-old chicks are produced. Again, between the same periods reported earlier (i.e. 1980s to 2000s), the number of domestic hatcheries reduced from 28 to 10 (VSD, 2013). The existing hatcheries are currently producing under their capacity due to the low level of domestic demand (GRAIN Report, 2013). This low level of domestic demand is as a result of high mortalities recorded during brooding period as well as poor laying ability of birds. Domestic farms mostly import day-old chicks from Brazil, the European Union and the United States rather than buy them domestically.

- **Influx of Frozen Poultry Meat**

The domestic market is characterized by cheaper frozen poultry meat which pose competitive challenge to domestically produced poultry meat. Only 10% of the total market demand for broilers is supplied domestically with the remaining 90% being imported from the European Union, United States and Brazil (USDA, 2013). This has been attributed to the high prices of domestic broiler meat which cannot compete with the cheaper imported frozen ones. In 2012, Ghana imported 75,160.4 MT of poultry meat (MOFA, 2013). This imported frozen poultry meat is relatively cheaper than the ones produced domestically and tends to provide a stiffer competition to the domestic

industry. Evidence from the grain report indicates that, imported poultry meat tends to be 30-40 percent cheaper than the domestic poultry meat. All these hamper the successful operations of the local poultry industry.

- **Poultry Diseases and Sanitation**

The common diseases affecting the poultry industry are Chronic Respiratory, Newcastle, Equalizer, Coccidiosis, Bird Flu among others. Generally, it is asserted that diseases and its control pose a major challenge to poultry farmers. The reason being that most of them operate on a small scale level, and as a result face financial challenges in combating poultry diseases if affected. Again, there is poor sanitation in and around most poultry houses and it is not surprising if there is outbreak of diseases. Overpopulation of birds, poor ventilation coupled with poor sanitation provide the openings for such diseases already identified. Necessary treatments such as sustained vaccination is recognized to be necessary however, obtaining access to such service is expensive inhibiting most farmers to go in for them.

- **Access to Finance**

Just as with every business, access to finance is a challenge especially when the business is operating on a small scale with limited equipment and prospects to expand. The poultry industry is no exception when it comes to having access to finance both for start-up and expansion. The capital needed to start-up a farm enterprise is very high. Construction of brooder house furnished with all necessary equipment is very expensive due to the high cost of timber and other inputs. Financial institutions from which such funds could be attained from are sometimes reluctant to do business with farmers especially small and medium scale farmers since the prospects for expansion seems gloomy making it difficult for them to expand their operations. The few ones who agree to loan terms with farmers do so at a higher interest. Cost of feed ingredients and additives constantly

keep increasing making it more difficult for farms to expand while some eventually abandon their business for other profiting ventures.

- The cost of transporting birds and eggs from long distances to markets, unavailability of grains and protein supplements, poor technology, death losses, collapse of processing plants, competition between human and poultry for grains, climatic conditions and many others pose a challenge to farmers in the poultry industry.

### **Prospects of the Poultry Industry**

Amidst the numerous challenges outlined above, there is still light at the end of the tunnel. The prospects of this sector depend among others on the investment opportunities provided by the sector in the production, processing and sale of poultry products. Some of the prospects are outlined below:

- **Expected rise in consumer demand**

For every business, demand is a key factor. The population census of the country projects a rising population with a growth rate of 3% per annum. Many Ghanaian consumers in recent times are developing taste for domestic poultry products ranging from live birds to dressed and cut poultry meat. These are strong indicators in favour of the poultry sector. Demand for poultry products tend to rise during festive seasons such as Christmas, Easter, Eid al-Fitr, Eid al-Adha etc. The potential rise in population and taste developed by consumers are possible boost for the poultry sector. Farms such as Darko Farms and Cottage Farms have as a result established cold stores in Accra that deal in the selling of frozen domestic poultry products ranging from Chicken legs to whole birds to meet the rising demand of domestic poultry.

- **Availability of poultry inputs**

Poultry feed and DOCs have afore been identified as challenge in the industry. However, the prospects are bright for the provision of quality feed and DOCs due to the fact that since the year 2011, the quantities of feed ingredients and DOCs imported have increased. For instance, imported pre-mix, soya bean, and DOCs increased more than 100% between 2011 and 2012 (FAO, 2014). Numbers of imported parent stock for breeding and consequently to produce DOCs locally increased during the same period. Land availability as well projects a hopeful prospect for the sector. The northern, upper west and upper east regions have vast areas of land that can support poultry. The southern sector of the country is not an exception. Some parts of Ashanti, Brong Ahafo and Eastern regions have vast lands for expansion of poultry farming and its associated activities. Also, availability of maize and soya bean which is mostly used in the production of poultry feed are in constant supply with prospects of increase in production in the years ahead. The National Food Buffer Stock Company (NAFCO) was initiated in 2009 with the mandate of managing government's food security and stabilizing prices of major cereals such as maize, soybean and rice (FAO, 2014). NAFCO has since supplied poultry farmers with cereal at stable prices throughout the year to ensure smooth operations of poultry farms.

- **Willingness of Government**

The government has shown willingness to assist the poultry industry through policy interventions and regulations. The Diseases of Animal Act, 83, 1961 is under review to include poultry hygiene which will ensure healthy production of DOCs that conform to international standards (FAO, 2014). The Act will as well ensure regular monitoring of the operations of hatcheries in order to accomplish the objective of producing healthy DOCs. Also in 2003, the GoG established the Ghana Poultry Development Board which is currently under consideration to be changed to a Council. The Council will provide advisory services to the government on the poultry sector.

Additionally, the President's Special Initiative selected some farms including Darko Farms and other 19 local industries to receive special incentive packages under the Initiative (Daily Graphic, 22 August 2013). Other interventions and policies such as the removal of custom duties on poultry inputs (feed additives, drugs and vaccines), Food and Agriculture Sector Development Policy (FASDEPII), Medium Term Agriculture Sector Investment Plan (METASIP) 2011-2015, Medium Term Agriculture Sector Investment Plan (METASIP) 2011-2015 etc. have all come to play to assist the poultry industry. Perhaps the current government's pledge to support the private sector and SMEs will not leave out the Poultry industry.

- **Finance**

The springing up of micro financial institutions as well as other financial institutions pose a hopeful prospect for the industry. These include the Export Development and Agriculture investment Fund (EDAIF), Pro Credit, Sinapi Aba Trust, Venture Capital Fund and Rural Banks. Farms are also becoming more innovative in terms of accessing funds which is a good signal for the sector.

- **Education and Capacity Building**

The nature of the poultry industry requires regular training of managers of farms ranging from disease control to housing of birds. It is therefore necessary for VSD and all stakeholders to organize periodic training for farmers to upgrade their level of technology and operations. In recent times, several training and capacity building sessions have been organized. For instance in March 2013, the USA Poultry and Export Council and HACCP Consulting Group sponsored a capacity building program on Hazard Critical Control Point (HACCP) with the theme "Developing and Implementing HACCP Plans in the Meat and Poultry Plants". Again, in line with the support to the Food and Agriculture Sector Development Policy (SFASDEP), Multi Donor Budgetary Support (MDBS) Targets, the Directorates of Veterinary Services and Animal Production

organized a one day training seminar on “Good Agriculture Practices” in the livestock and poultry industry in Sunyani and Kumasi in March 2013 of which eighty farmers were trained (VSD, 2013).

- Other prospects include sale of poultry manure, advocacy for improved policy environment in the poultry sector, improvement in rural poultry production, growth of the guinea fowl sector, improvement in sanitation etc.

## **2.4 Review of Theoretical Literature**

### **The Theory of Production:**

Poultry farms combine inputs such as poultry feeds, DOCs, labour etc. to produce two essential outputs which are eggs and chicken. This mirrors the idea put forth by the theory of production. The theory of production is the study of production, or the economic process of transforming inputs into outputs. In other words the theory is concerned with transforming resources or inputs such as labour, power, raw materials and capital into finished product. Some economists define the term production in a broader spectrum as all economic activities other than consumption. Production is a process and as such occurs through time and space. This means that production is not a static concept but rather a flow concept and as such it is typically measured as a rate of output per a specific period of time. Production activities involve the use of factors of production. In economic terms, factor of production describes all inputs that are used in the production of goods and services purposely for economic benefits (profit). Such factors include land, labour, capital and entrepreneurship.

There is a technical relationship that provides a linkage between the inputs already identified and the final outcome for a given state of technology which is popularly termed the production

function. Simplistically, it is expressed in the form  $Y = f(a, b, c, \dots, z)$ , where  $a, b, c, \dots, z$  represents all the inputs used such as land, labour, capital etc.  $Y$  is the level of output produced.

It must be noted that, since poultry farms are multi-product firms (i.e. producing both eggs and chicken), the output component in the expression above will be a make-up of two outputs which are eggs and chicken. There is, therefore, the need to find another variable that will marry the two different outputs of poultry farms and give them a common unit of measurement. This variable is the sales made by farms which will later be captured as weekly sales in this study. Sales, therefore, perform the role of output and also serve as a proxy for performance. Sales or total revenue is obtained by multiplying the product price by the quantities produced (Output). Since we have identified earlier the multi-product nature of poultry farms, taking just the output could be misleading due to the varieties of output produced (i.e. eggs and chicken). It is therefore imperative that the study adopts another variable that captures the different output component of the production units (poultry farms) and still maintains the core understanding of the theory of production.

There are several functional forms of the production function as Griffin et al. (1987) have done a comprehensive review of popular and traditional functional forms used in the analysis of production. They identified twenty functional forms and categorise them according to their intrinsic properties. One of the popular functional forms of the production function that is widely used was put forth in 1928 by Charles Cobb and Paul Douglas.

The function put forth by Charles Cobb and Paul Douglas is popularly known as the Cobb-Douglas (C-D) production function. It reflects the relationship between inputs - physical capital and labour, and the amount of output produced. The function although old is still in usage largely because of

its simplicity, flexibility and its linearity in the parameters. The C-D function, unlike the CES can be generalized to more than two inputs. The C-D function is mathematically expressed as:

$$Y = AK^{\alpha}L^{\beta}.$$

Where A is the level of technology, K is capital and L is labour. The Greek characters  $\alpha$  and  $\beta$  represent output elasticity of the inputs employed. Output elasticity is the change in the output produced that results from changes in the inputs employed. When the Greek exponential characters sum up to one, it portrays that the production function is first-order homogeneous, which implies constant returns to scale.

The function has several properties which have made it widely used and acceptable for the analysis of economic theories. One of such properties is that the degree of homogeneity of the function is the summation of the output elasticities  $\alpha$  and  $\beta$ . It could be less than, greater than or equal to one depending on the values of the output elasticities. If we introduce a constant factor as “t” to the production function, we arrive at:

$$Y = A(tK)^{\alpha}(tL)^{\beta} = t^{\alpha+\beta}(AK^{\alpha}L^{\beta}) = t^{\alpha+\beta}(Y).$$

The result obtained shows that if we increase capital and labour by a constant factor “t”, Output (Y) would increase by the factor  $t^{\alpha+\beta}$ . The outcome as well gives the condition for the C-D function to be linearly homogenous or homogenous of degree one if the sum of  $\alpha$  and  $\beta$  is one. In such an instance, output increases by the introduced constant factor “t”. However, if the sum of the output elasticities of the inputs is different from one, then we have a generalized version of the C-D function.

Another property of the C-D function is that the average and marginal products of labour and capital would all be functions of capital-labour ratio. Assume given a linear homogenous production function of the form  $Y = AK^\alpha L^\beta$ . The average product of say labour becomes:

$$AP_L = Y/L = \frac{AK^\alpha L^\beta}{L} = AK^\alpha L^{\beta-1} = AK^{1-\beta} L^{\beta-1} = A \left(\frac{K}{L}\right)^{1-\beta} \dots \dots \dots (1)$$

The marginal products of the inputs say labour becomes:

$$MP_L = \frac{dy}{dL} = \beta AK^\alpha L^{\beta-1} = \beta AK^{1-\beta} L^{\beta-1} = \beta A(K/L)^{1-\beta} \dots \dots \dots (2)$$

It can be observed from equations (1) and (2) that the average and marginal products of labour are functions of capital-labour ratio. The same is true for that of capital. The economic sense in this is that if such a firm changes the quantities of its inputs keeping their ratios the same as before the change, the marginal and average products of such a firm would remain the same. Simply put, the marginal and average products of the firm can only change if the firm changes the inputs in different proportions.

The final important property to consider is that the marginal rate of technical substitution is the ratio of the marginal products of the inputs. This is shown as:

$$MRTS_{L,K} = MP_L/MP_K = \beta A(K/L)^{1-\beta} / \alpha A(L/K)^{1-\alpha}$$

In the case of the C-D production function, the average and marginal product curves would be downward sloping. What this means is that if any one of the inputs is increased with the other remaining constant, the average and marginal product of the former input (i.e. the input that is increased) would reduce. It is therefore advisable for firms to alter both inputs simultaneously.

Also if the inputs employed are paid the rate of their respective marginal products, what is meant is that total output would be exhausted. There are several other properties of this function that makes it unique and widely used however, these are the few important ones we will consider for the sake of this study.

There are several advantages of the C-D function such as its wide suitability and usage in all industries, convenience in international and inter-industry comparisons, wide usage in the field of econometrics and popularity in empirical work. Most importantly, it can be fitted to time series and cross sectional analysis as well as be used for “n” number of inputs.

A similar analogy of the C-D function was adopted by Robert Solow and Trevor W. Swan in 1956 to explain that the achievement of a steady economic growth is dependent on three major driving forces namely labour, capital and technology. The theory is only an extended form of the Harrod-Domar model which includes labour as another factor of production and a capital-output ratio that is not fixed. These refinements allow the difference between increase capital intensity and technological progress. The theory states that equilibrium state can only be accomplished by varying the capital and labour in their right proportions into the production function and also not discarding the influential role technological change plays in the function in that economic growth can never be continuous without advances in the rate of technology. Solow treated the rate of savings and population growth as exogenous and explained that these two variables are external to the growth process.

Just as many other 20<sup>th</sup> century production models, the Solow growth model also adopted mathematical concepts in their modelling and operated on series of simplified assumptions such as perpetual full employment, no intervention from government, constant returns to scale, a given initial level of capital and labour as well as the factors being paid according to their marginal

physical productivities etc. which are not always the case in the real world. Mathematically, the Neoclassical (Cobb-Douglas) aggregate production function is stated as:

$$Y = AK^{\alpha}L^{\beta}$$

"Y" denotes output or the gross domestic product (GDP), "A" represents the level of technology, "K" represents capital and "L" describes the amount of labour in an economy. However, due to the relationship between labour and technology, the production function can as well be re-written as:  $Y = F(K, AL)$ . A change in any of these factors allows a person to observe how output or GDP is affected and therefore its dynamics on the equilibrium of the economy.

The function exhibits the usual Cobb-Douglas properties such as linear in the parameters, marginal productivities being positive and decreasing among others. It is however important to note that these factors affecting GDP are unequal. The returns to labour and that of capital on an economy are diminishing in nature. The model predicts that if all countries are in their steady state and yet still one country is better than the other then the possibilities are that perhaps the richer country has higher savings rate or lower population growth rate than the poorer country.

The work of Robert Solow was a modification of the classical growth theory which placed emphasis on a single homogeneous consumer block and a single homogeneous firm, each with infinite lifetimes. The total output of the firm is likened to the total income of the consumer. One exposé of the model is that the benefits recruited from investment in capital is treated as temporal instead of permanent (Investopedia.com). This is the heart of how the Solow model explains the difference between output and growth. The introduction of new capital into the economy initially increases the capital-labour ratio but eventually the marginal product of capital declines as a result of diminishing returns which forces the economy to regress back to its long-term growth path.

According to the model, the real explanation that can be given for differences in economic output between countries is the rate of change in technology and labour growth. Oddly, the model treats improvement in production as completely exogenous and totally independent of capital investment. Perhaps this strange treatment of capital has resulted in the consistent and damning critique of the neoclassical growth theory and has resulted in evolution of other models of growth.

The model has received several criticisms including Paul Samuelson, the author of the most influential series of economics textbooks in the 20th century who claimed that the introduction of technology as an exogenous variable by Solow was due to an external force Solow received so as to "save the underlying theory." Again, others speculate that the particular mathematical attractiveness of the model prepared a very convenient starting point for various extensions to it. In conclusion the model assumes that investment in machinery is not a source of growth in the long-run. Secondly, savings has no permanent effect on growth. It only has a level effect and will not sustain growth permanently but only diverts money from consumption today towards buying machinery for production tomorrow which will not raise the long-term rate of growth.

Another functional form of the production function is the Constant Elasticity of Substitution (CES). Similar to the C-D production function, the CES consist of one output variable and two inputs variables (i.e. capital and labour). It is also referred to as Homohighplagic production function. It is believed to have been first introduced by Robert Solow and later made popular by Chenery, Arrow, Minhas and Solow in 1961. It is mathematically expressed as:

$$Y = b[(aK^r + (1 - a)L^r]^{1/r}$$

Where “Y” is the output, “b” represents the factor productivity or the efficiency parameter that indicates the state of technology and organisational aspects of production, “a” the share

parameter, “L” and “K” the primary production factors,  $r = (s - 1)/s$ , and  $s = 1/(1 - r)$  are the elasticity of substitution of the function which is the reason behind the name constant elasticity of substitution (CES) production function. In this CES function, the elasticity of substitution is constant and not necessarily equated to one.

The function exhibits the following properties: The value of elasticity of substitution depends on the value of substitution parameter, the marginal product of any input will increase when other factor inputs increase, the marginal products of labour and capital are always positive whenever the assumption of constant returns to scale is assumed and also slopes downward.

Some of the merits of this function includes: its coverage on all types of returns, generality, accounting for several parameters, also considers raw materials among its inputs, easy to estimate and devoid of unrealistic assumptions. However, there are some drawbacks associated with the CES production function such as: One may encounter problems such as large number of choice of exogenous variables, estimation procedure and the problem of multicollinearities in estimating the CES function. Also in attempting to remove the problem of multicollinearities there is a possibility of magnifying the errors in measurement of variables. The CES function has received criticisms at to the possibility of identifying the production function under technological change.

The attempt of researchers to discover new and more flexible forms of production functions which also approximated the CES production function led to the birth of the Translog Production Functions. The first of its kind came about in a proposal by J. Kmenta in 1967. Similar to the C-D production function, this first Translog function was for the approximation of the CES function with a second order Taylor series with the elasticity of substitution approaching unitary. The function was expressed as:

$$\ln Y = \ln A_3 + \alpha_3 \cdot \ln K + \beta_3 \cdot \ln L + \varphi_3 \ln^2(K/L).$$

Later on in 1971, Grilichs and Ringstad proposed a new form of the function which was in one of a second order polynomial in the logarithms of the single input considered. This new form of the function only relaxed the constraints imposed on the parameters in the earlier Kmenta function. The reason behind this new invention was to test the homotheticity assumptions.

The function was written as:

$$\ln Y = \ln A_{KL} + \alpha_K \cdot \ln K + \alpha_L \cdot \ln L + \beta_{K^2} \ln^2 K + \beta_{L^2} \cdot \ln^2 L + \beta_{KL} \cdot \ln K \cdot \ln L$$

Sargent in 1971 adopted this same function and called it a log-quadratic function. It is worth noting that the term “translog production function”, abbreviated from the term “transcendental logarithmic production function“ was proposed by three writers: Christiansen, Jorgensen and Lau in their papers in 1971 and 1973 which provided solutions to the problems of strong separability (additivity) and homogeneity of both the Cobb-Douglas and CES production functions and their implications for the production frontier. The generalized form of the Translog function can be expressed as:

$$\ln Y = \ln A_{\alpha_i \beta_j} + \sum_{i=1}^n \alpha_i \cdot \ln X_i + \left(\frac{1}{2}\right) \cdot \sum_{i=1}^n \sum_{j=1}^n \beta_{ij} \cdot \ln X_i \ln X_j$$

It is believed that the translog production functions provide a more flexible kind of the functional forms for the production functions (Allen & Hall, 1997). Unlike the C-D production function, the Translog production function does not assume rigid premises such as: perfect substitution between production factors (Klacek, et al., 2007). Again, this concept of the translog production function allows a transition from a linear relationship to a nonlinear one. Its properties allow it to be used

for several purposes as: estimation of the Allen elasticity of substitution and production frontier etc. It can as well be used for the second order approximation of a linear-homogenous production.

The final functional form to be considered is the Variable Elasticity of Substitution production function which came about as a result of the efforts of Knox, Bruno, Revankar and Lovell to discover a new production function which has a variable elasticity of substitution. The VES function is a generalised form of the CES which this time possesses a more desirable properties of variable elasticity substitution. This function satisfies the requirements of the neo-classical production function, it is more general and can be employed when generalising production functions and it includes a fixed co-efficient models.

## **2.5 Review of Empirical Literature**

This subsection considers empirical work and findings in other studies in relation to the topic under consideration. It captures factors affecting the performance of SMEs and places more emphasis on the poultry sector. Different outcomes have be identified by different authors from different geographical regions. Some of their outcomes and methods have been assessed and summarized below.

Akinboade (2015) employed a regression analysis to discuss the growth and performance of small and medium sized enterprises (SMEs) in Central and Littoral provinces of Cameroon's manufacturing and retail sectors. The Author used annual business turnover as a proxy for performance and found that the number of years in operation of an enterprise positively affected its performance. Again, increasing levels of education of the manager of the enterprise had a positive effect on performance up to the secondary level beyond which it began to decline. The

findings did not provide any support for gender based differences in performance. This means that there was no association between gender and performance.

In their research to examine the performance and constraints of Small Scale Enterprises (SSE) in Accra Metropolitan Area of Ghana, Martey et al. (2013) made use of independent variables such as age of entrepreneurs, experience, marital status, gender, education, number of employees, ownership status, initial capital and annual cost and concluded that the age of an entrepreneur was one of the most influential determinants of performance of SMEs. Other findings further indicated that the performance of married entrepreneurs was lower than their unmarried counterparts. Again, the number of years of formal education of the entrepreneur, annual cost incurred, years of experience and the number of employees (size of the firm) were positively associated with performance whereas initial capital invested in the business had a negative relationship with performance. The data collection technique used was survey questionnaire and interviews.

Fatoki (2011) employed an ordinary least square method to evaluate the Impact of Social, Financial, and Human Capital on the Performance of SMEs in South Africa. The author administered questionnaires as a means of collecting data. With an overall number of one hundred and twenty-two returned questionnaires out of a total number of three hundred and thirty-two administered questionnaires, the ordinary least square results revealed that there existed a positive relationship between human, financial, social capital and the performance of SMEs in South Africa.

Mutandwa et al. (2015) employed a Factor analysis and bivariate correlation analysis to investigate the determining factors of the performance of SMEs in Rwanda. Their objective was to find out the factors that influence the performance of SMEs in some selected sectors of the Musanze district in the Northern Province of Rwanda. Using annual net income as proxy for performance, the

research established through the bivariate correlation analysis that business experience and size of enterprise (measured as asset size) increased annual net income (performance). The factor analysis established that three factors namely marketing and entrepreneurship skills, working environment and materials and infrastructure availability determined performance.

Mudavanhu et al. (2011) studied the determinants of SMEs Failure in Bindura town of Zimbabwe. Using return on investment (ROI) as a proxy for SMEs failure and a dependent variable whereas variables such as education, domestic competition, availability of credit and cost of raw material were employed as the independent variables, the study through the use of OLS estimation criteria established that lack of general knowledge of business management, unavailability of credit, import competition and high cost of raw materials were the primary cause of the failure of SMEs in Zimbabwe. The method of data collection used was through formal and informal interviews, questionnaires as well as through focus group discussions with randomly selected SMEs from different clusters representing various industries.

Altahat et al (2012) employed a multiple regression profit model (stepwise regression Method) to investigate the factors affecting the profitability of layer hens enterprises in Jordan. The focus of the study was to investigate ten main factors that were perceived to affect the profitability of layer hen producers. The ten factors that were investigated were price of purchased pullet, feed price, cost of labour, cost of veterinary service and medicine, building and machinery depreciation, repairs and maintenance and miscellaneous costs, length of production cycle, feed conversion ratio, mortality rate, egg sale price and laying percentage. The study results revealed that feed price was the factor which had the highest negative impact on the profitability whereas egg sale price was recorded to have the highest positive impact on profitability.

Oladeebo and Ojo (2012) conducted an economic appraisal of small and medium scale performance in poultry egg production in Ogun State. Specifically, they employed the budgeting and OLS regression techniques to examine the cost structure and level of profit in the poultry sector as well as the factors that determine the revenue of poultry egg farmers. The study results showed that cost of feed constituted the largest share of the total costs for both small and medium size farms. Although poultry egg production was profitable in the study area, the level of profit strongly depended on the scale of operation (i.e. whether production is on a small scale or large scale). Also, the amount spent on veterinary services was the only significant determining factor of revenue accruable to poultry egg farmers.

Kirui (2014) as well investigated the factors that influenced the performance of poultry farming projects in Kericho in Kenya. The objectives of the study were to determine the influence of extension service, the level of education of the farmer and the cost of inputs on the performance of poultry farming projects. By using the level of production as a proxy for performance and adopting both quantitative and qualitative techniques, the study revealed that farmers who had access to extension services realized 33% higher performance than those without extension service. Also, the results showed that highly educated farmers performed better than less educated ones and a negative correlation was established between the cost of feed and performance.

Mendes et. al. (2013) researched into the factors that impacted the Financial Performance of Broiler Production in Brazil. After submitting the data to descriptive statistical analysis, it was observed that the level of education, facility size, type of labour, gross income per flock, and average bird weight at slaughter had positive impact on financial performance. Also, the most challenging production problems that most of the broiler production farms faced included environmental challenges, management problems and low-quality chicks.

Kyeremeh (2008) analysed the impact of commercial poultry production on the livelihood of producers in the Dormaa Municipality. The study employed the pooled standard error statistical difference between two-means. The study established a significant effect of commercial poultry production on the livelihood of producers in terms of health, nutritional and educational statuses of children in the current period as compared to their status before they entered into poultry production.

Adjei (2014) employed the Binary Logit model on the same study area (i.e. Dormaa Municipality) to investigate the factors that influence farmers' participation in poultry insurance which in the long run influence their performance. The results showed that, Age of farmers, farm size, experience, impact of diseases and multiple income sources influenced farmers' willingness to participate in poultry insurance in the Municipality. Age, farm size, experience and impact of disease had positive influence on the willingness to participate in poultry insurance whereas multiple income sources established a negative relation with the dependent variable.

Richard, B. K. (2010) undertook a study to access the sources and effects of microfinance services on small-scale poultry farming in the Atwima Nwabiagya District in the Ashanti Region of Ghana. Descriptive statistics and the paired t-test were employed in the study. The study results showed that both formal (rural banks and cooperatives) and informal (money lenders and shopkeepers) sources of microfinance services were available to poultry farmers in the study area. Again, it was observed that there was an improvement in performance of clients (i.e. poultry farmers) following the receipt of micro finance services especially microcredit. Specifically, access to microfinance credit lead to expansion in production, provision of better housing for poultry, rise in employees and poultry flock, improved technology, ability to give necessary veterinary treatment and ability to purchase other farm inputs which boosted the performance of the farmers in that study cluster.

Dawit (2010) in an attempt to identify factors that influence market participation decision and sales performance of poultry in Alamata and Atsbi-Wonberta Woredas of Tigray (Ethiopia) by adopting the Heckman Two stage approach revealed the sex of the household head, level of education of the household head, family size and distance to market negatively influenced market participation decision of poultry. Several reasons were attributed to these findings. For instance, the negative coefficient of the sex of the household head was ascribed to the lack of good management practices by female heads which increased death rates of poultry birds thereby reducing the probability of females to participate in the poultry industry by 14.5%. The second stage of the Heckman Two Stage model also discovered that the quantity of poultry owned influenced sales performance. That is the more the quantity of poultry owned by the household, the more will be the value of poultry sales especially if they are well managed and kept.

Similarly to the findings of Dawit, Barrett and Bellemare (2006) also discovered that the sex of household head, herd size, household age, Percentage of female Tropical Livestock Units (TLUs), encumbered males, births and individuals in the household had negative correlation with sales performance of animals sold in Ethiopia and Kenya by employing an Ordered Tobit Model. On the other hand, deaths, land holding, house hold head age squared, assets, fixed and variable fees, other incomes and average price of larger stock (i.e. camels and cattle) were positively correlated with number of animals sold. The reasons given for some of these findings were that for instance due to the ceremonial expenses associated with death rites, it increased the number of animals sold. Again, household's income increased the number of animals sold which explained that livestock is a normal good.

Earlier to the findings of Barrett and Bellemare was the study conducted by Gizachew (2005) on dairy marketing. The focus of the literature was to identify the variables that influence dairy

supply. The paper employed Maximum Likelihood Estimation procedure (logit model) to identifying factors that affected the decision to sell dairy products. In investigating into factors affecting decision on volume of dairy sales, the Tobit model was used. The independent variables which were classified into household demographic characteristics included sex, education level and household size. Other socio-economic variables such as physical and financial wealth and extension visits as well as transaction cost which was measured by distance to market and the urban centres were included. The findings revealed that Household size, extension contact, spouse education and transaction cost affected positively dairy supply while household education negatively affected the dependent variable in this case dairy supply.

Awol (2010) in the study titled analysis of poultry market chain, the case of dale and alaba special woreda of SNNPRS, Ethiopia investigated factors that affected the decision of farmers to participate in the supply of live birds and eggs as well as the volume of those products (birds and egg) supplied to the market. The study as well investigated some of the constraints and opportunities of producing and marketing of poultry in the study area. In attempting to address the mentioned objectives, descriptive statistics and econometric models (Heckmans' two stage and Tobit model) were employed. The study revealed that variables such as family size, sex of the household head, total number of birds kept and feed supplementation significantly influenced farmers' decision to participate in the supply of live birds and egg to the market. In terms of the value of volume of birds and eggs supplied to the market, the linear supply function and the Tobit models found that the total number of birds that the family kept, market access, feed supplementation, purpose of poultry keeping, producers participation decision in bird and egg supply and credit were significant variables that influenced the dependent variable. Lack of capital, diseases, lack of inputs among others were identified as constraint to the poultry sector.

A similar study conducted by Holloway et al. (1999) sought to identify alternative techniques that affected sales performance of milk among peri-urban milk producers in the Ethiopian highlands. It was discovered that cross breed cow type (modern production practice), local breed cows (traditional production practice), extension contact, education level of household head and experience in farming of the household head positively affected the quantity of milk sold (sales performance). On the other hand, distance to the market adversely affected the quantity of sales.

Availability and access to market information to farmers have been found to be one variable that positively influence both formal and informal market participation among small holder farmers to participate in poultry production for marketing. For instance Sonaiya et al., (2005) discovered among small holder farmers participating in poultry marketing that significant values for both formal and informal market choices imply that there is adequate evidence to support that an increase in the availability of market information results in an increase in both variables (i.e. informal and formal market participation).

Not only access to information but access to credit has been identified to determine participation in poultry production for marketing. For this purpose, Komicha (2007) in South Eastern part of Ethiopia revealed that, the poor performance of the agricultural sector was partly explained by the poor nature of rural infrastructure as well as the absence of rural financial institutions that facilitate rural economic development. Komicha stressed on the importance of access to credit by maintaining that it is an important institutional factor not for only the agricultural sector but all other sectors of economic activities including the smallholder producers who are mostly constrained by credit. The credit constraint affects the purchasing power of farmers in terms of inputs purchasing, inability to cover operational cost, inability to make farm related investments among others. Mesfin (2006) supported this claim by asserting that even in the presence of

financial institutions, some farmers may not have access to credit due to problems related to repayments and down payments.

Aside the latter discoveries by Komicha and Mesfin's, Abebe (1999) had earlier revealed that availability of poultry feed is one main determining factor of farmers' participation in poultry production for the purpose of marketing. Abebe's assertion was that, a farmer can either decide to start-up or if already involved in the production expand his/her activities based on the perception of feed availability particularly through own production. Hence, if a farmer perceives the availability of feed for his/her poultry, s/he can then decide to start-up in the poultry business or if already in existence expand the poultry production activity and thus established a positive relation with the market participation in poultry as well as total sales value from poultry marketing. That is, the perception of feed availability informs participation as well as expansion for existing farms which altogether increase production and ultimately lead to higher sales establishing a positive relation between market participation and total sales. Kenea et al. (2003) as well discovered that herd size determines market participation decision and income from poultry products among smallholder poultry producers.

The summary from the review of empirical literature has revealed that several factors affect the performance in the poultry industry. Frequently reported variables included; experience of farmers, level of education of managers, age of farm, size of farm, access to finance or credit, age of manager of farmer, extension contact and availability or the cost of poultry feed. Also different measures of performance that ranged from returns on investment to output or production were adopted in different studies. This study is unique in its choice of area as well as variables. To this regard, it will serve as a positive addition to literature, particularly as it pertains to poultry farming in the Dormaa area of Ghana.

## **CHAPTER THREE**

### **METHODOLOGY**

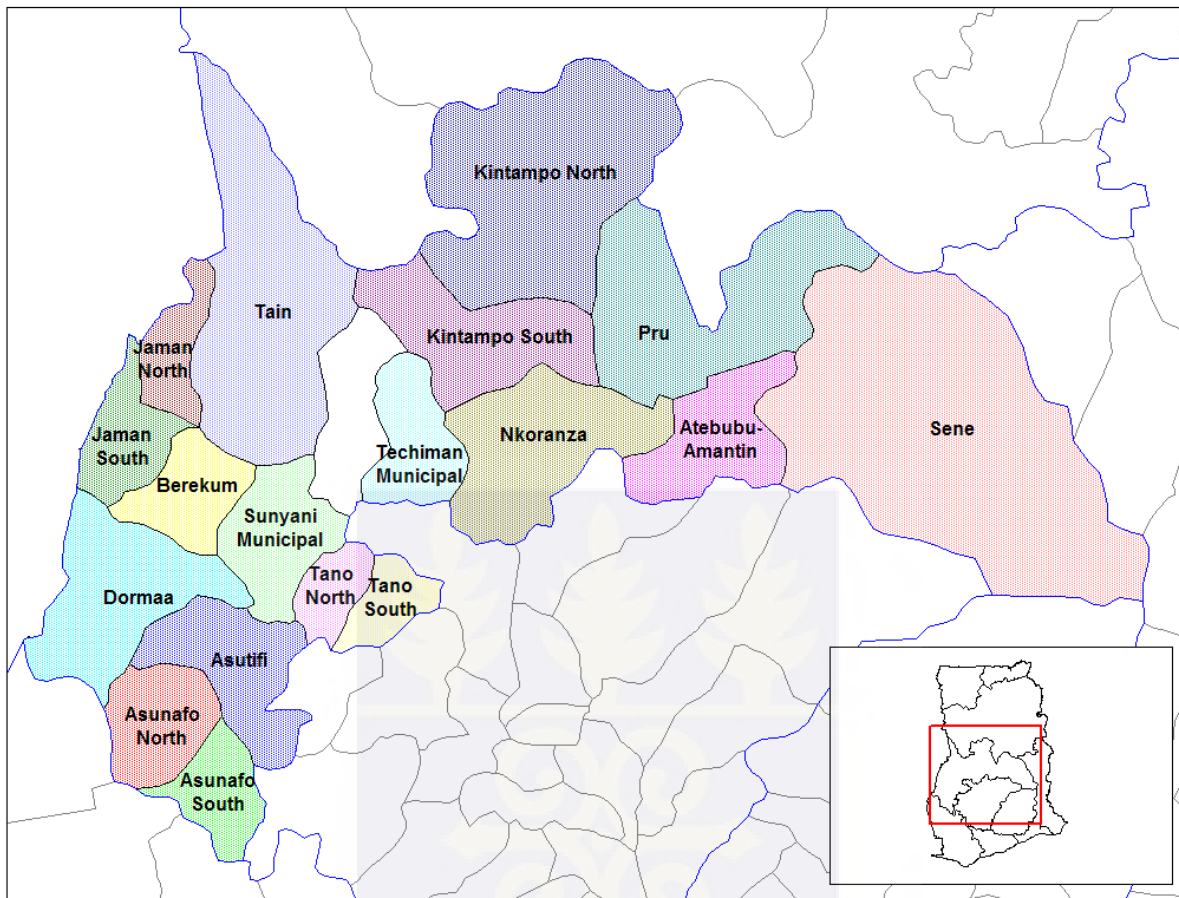
#### **3.1 Introduction**

This chapter presents a brief profile of the study area, the sources of data for the estimation of the empirical model and the research methodology for the study. For the achievement of the objectives outlined in the opening chapter, the study adopts an appropriate research methodology aimed at assisting in the accomplishment of the set objectives. The framework, model specification and measurement, and justification for all variables as well as the expected relationship between the explained and explanatory variables are captured in this chapter.

#### **3.2 Profile of the Study Area**

The Brong Ahafo Region which was formerly part of the Ashanti Region was created in April 1959. The region shares border to the north with the Northern Region, to the south with Ashanti and Western Regions, to its east is Volta Region, to the south-east is the Eastern Region and La Cote D'Ivoire to its West. Within the region is Dormaa. Dormaa was formerly a district but currently a municipality. It is located in the Western part of Brong Ahafo. The Municipality is bounded to its north by Jaman South District and Berekum Municipal, to its east by Sunyani Municipal, to its south and southeast by Asunafo and Asutifi districts respectively and in the west and north-west by La Cote d'Ivoire. The Municipal capital is Dormaa Ahenkro which is located about 80 kilometres west of the regional capital, Sunyani. Dormaa occupies a total land area of 917 square kilometres, which constitute 3.1% of the total land area of the Brong Ahafo Region and about 0.52% of Ghana's total land size. Dormaa has about 296 settlements, one traditional authority and three constituencies, namely Dormaa Central, West and East.

Figure 3.1 Map of the Brong Ahafo Region



Source: [https://commons.wikimedia.org/wiki/File:Brong\\_Ahafo\\_districts.png](https://commons.wikimedia.org/wiki/File:Brong_Ahafo_districts.png)

Based on the 2010 Population and Housing Census, the total population of the municipality was 112,111 representing 4.9% of the total regional population with male and female constituent of 47.8% and 52.2% respectively. There are different ethnic groups in the municipality such as Anyins, Northerners etc. However, the Bono's predominate the municipality with Bono-Twi as the major spoken language.

In terms of occupation, agriculture is the predominant activity in the municipality. The occupation employs about 62% of the active labour force with services employing 18.4% of the municipality's

active labour force whilst industry and commerce absorb 8.6 and 11.0 percent respectively<sup>2</sup>. About six out of ten households (68.4 %) in the municipality are engaged in agriculture. Most households in the municipality (65.4 %) are involved in crop farming and about 15% are engaged in Poultry whereas the rest engaged in other agricultural activities (Adei & Asante, 2012). Farming activities are largely on a small scale basis with poultry activities especially egg production being carried out on large scale.

Table 3.1 Movement of table eggs from Dormaa Ahenkro to Accra (2007-2012)

<b>Year</b>	<b>Number of Eggs</b>
2007	2,721,000
2008	39,480
2009	47,283,810
2010	141,949,380
2011	32,241,100
2012	31,437,000

Source: Veterinary Service Dormaa Ahenkro, 2013.

Table 3.1 shows the quantities of eggs moved from Dormaa to Accra. It can be observed that there was a significant reduction of the quantities of eggs moved after the year 2010. This was as a result of active surveillance for HPAI H5N1 by the veterinary service and stricter movement control. This notwithstanding, the trends in table egg production in the municipality shows that the activity (i.e. egg production) is carried out on a large scale.

Over the years agriculture activities have been decreasing with service, industry, and commerce steadily rising. This steady rise can partly be attributed to the increasing volume of trade among

<sup>2</sup> [www.mofep.gov.gh](http://www.mofep.gov.gh) or [www.ghanadistricts.com](http://www.ghanadistricts.com)

some of the major market centres including Dormaa Ahenkro, Nkrankwanta, Kofi Badukrom and Amasu. Currently, the poultry industry specifically egg production is the only agriculture activity operating on a large scale which as well is the largest in the region. The industry employs a large proportion of the active labour force. Other livestock such as sheep, goats, cattle, pigs etc. are reared as can be observed from Table 3.2 below. The poultry sector in the municipality is no exception of the earlier constraints identified to hinder the poultry sub-sector of the nation.

Table 3.2 Livestock and Poultry Production in the Dormaa Municipality in 2008

Type	Number
1. Chicken (Exotic Breed)	3,017,402
2. Cattle	3,253
3. Sheep	10,691
4. Goats	17,596
5. Pigs	2,806
6. Guinea Fowl	178
7. Ducks	932
8. Turkey	557
9. Chicken (Local Breed)	30,455

Source: The Composite Budget of the Dormaa Municipal Assembly, 2013.

Concerning natural resources, the municipality is blessed with Gold and clay deposits, forests and water bodies. The clay deposits are exploited for the production of burnt bricks. Valuable timber species like Mahogany, Odum, Papao, Asanfina etc. that are identified in the municipal's forest reserves are being extracted on a commercial scale. Many of the rivers and streams such as Bia, Nkasapim, and Pamu serve as a potential source of fishing and small-scale irrigation schemes.

In conclusion, some of the key agricultural challenges in the municipality are bush fires, rain-fed agriculture, difficulty in accessing credit facility, inputs supply, inadequate marketing and distribution outlets, and inadequate agriculture extension services among others. These notwithstanding, there are potentials for the sector which include the potential for export, absorbing of unemployed people, potential income generation, a springboard for industrial take-off etc.

### **The Role of Poultry in the Municipality**

The industry does not only provide chicken for consumers but also serves as a source of employment to other subsidiary industries, generates income to stakeholders as well as plays several other roles in the municipality. Below are some of the roles the industry plays specifically in the Dormaa municipality.

- The industry provides chicken which is rich in animal protein to its consumers. As a result of the mass production of chicken by several poultry farms in the municipality, chicken is relatively cheaper than that of other towns outside the municipality. Not only does the industry provide chicken rich in protein but also eggs. Table egg is one of the cheapest commodity on the market in the municipality.

- The industry employs several individuals both directly and indirectly. Acheampong (2015) advanced that the small and medium scale activities of the poultry sector located in Dormaa employ approximately 1,500 persons. Other people engage in menial forms of activities such as the sale of fried egg and chicken as a means of employment. There is also a boost in maize production and other cereals that are used as feed for poultry.

- Revenue generation to both the government and individuals engaged in poultry activities is an additional role played by the sector. Poultry farms pay taxes and other legal contributions to the government and other stakeholders.

- Crop farmers especially vegetable producing farmers benefit from the faecal component of the birds. The farmers use it as a manure to enrich the soil in producing good quality vegetables and other outputs. The faeces of chicken used as an organic fertilizer is rich in nitrogen, phosphorus, and potassium which boost crop growth.

### **3.2 Data Source**

The study employs a secondary microeconomic panel data comprising of 155 farmers located in the cluster area. The data is a two round panel collected over a period of two years ranging from the year 2014 to 2015. All variables employed for the study both dependent and independent variables were obtained from the microeconomic panel data of the field research of Dr. George Acheampong of the University of Ghana Business School on the said number of farmers. A composite list of 200 farmers was developed after discussions with all stakeholders including the Ghana Revenue Authority (GRA), the Municipal Assemblies, Assemblymen etc. After the compilation, recurring and non-enterprise farms were excluded reducing the total number to 163 farms. After contacting all 163 farms, 155 farmers agreed to participate in the study representing a 95.05% response rate. It is important to note that all farmers interviewed were in the study area. The data contains information ranging from owner's characteristics to general organizational competences.

### **3.3 Theoretical Framework**

This literature is guided by the concept underlying the traditional Cobb-Douglas production model. Cobb-Douglas Production Function has been widely used in the areas of economics, agriculture and other productivity studies in several countries and across many sectors. In this theoretical

framework of Charles Cobb and Paul Douglas (1928), two inputs – Labour and Capital are the explanatory factors of output. Just as every firm is assumed to be a technical unit in which commodities are produced and the entrepreneur converts inputs into outputs, subject to the technical rules specified by its production function, this study, therefore, adopts the C-D framework and remodel it to suit the objectives already outlined. The C-D function is typically specified as:

$$Y = AK^{\alpha}L^{\beta}$$

The Greek characters  $\alpha$  and  $\beta$  represents the respective output elasticities of capital and labour. The significance of these characters are that, for instance if the  $\beta$  value is 0.8, and there is a 40% rise in labour, output rises by 2% ( $0.8/0.4$ ). The same is true for output elasticity of capital. A 5% rise in capital will result in a 4% rise in output ( $0.2/0.05$ ). The intuition is that, output does not proportionately change by equal margin as the change in inputs due to the output elasticities. That is firms can change inputs by a certain margin but may not translate proportionally to the resulting change in output. Firms will therefore have to appreciate the output elasticities before altering their input mix.

The traditional Cobb-Douglas as identified in the preceding chapter exhibits different returns to scale resulting from the values of the output elasticities as shown below:

$\alpha + \beta > 1$ : Increasing returns to scale

$\alpha + \beta = 1$ : Constant returns to scale

$\alpha + \beta < 1$ : Decreasing returns to scale.

Taking the log transformation of the function leads to:

$$\ln Y = \ln A + \alpha \ln K + \beta \ln L$$

Where  $Y$  is output,  $A$  is the level of technology,  $K$  and  $L$  represent capital labour respectively. The Greek characters  $\alpha$  and  $\beta$  represent output elasticity of the inputs employed. This transformation is typically known as the log linear function. Syverson (2011) advances that undoubtedly the Cobb–Douglas-style approaches are probably the most commonly used production functions in many literature, however, many researchers have also adopted to a more general and flexible form of production function - translog form which is a second-order approximation to the general production functions as can be observed in the works of Caves, Christensen, and Diewert<sup>3</sup>.

The engine of the C-D production function is that production is explained by capital and labour. The output elasticities of these inputs communicate very important concepts. In real life situations, several other factors or inputs different from the concept that underlines the C-D production may explain or affect production. It is therefore not surprising to find a modified version of the Solow growth model put forward by MRW (1992). They used this concept in their extended human capital model of the production function. They augmented the traditional Solow model to include human capital as a determining factor of production or output. This concept of Cobb and Douglas has been widely used and adopted in many growth theories. Solow and Swan (1956) adopted the concept in their development of the Solow growth model. In the works of economists and researchers as Yang, Lucas, Arrow and Borland, they showed the role played by learning-by-doing in the evolution of countries to greater specialisation in production by adopting the C-D concept.

The first differential of the C-D function with respect to the inputs has a very significant property – the marginal product of the inputs. For instance, the first differential of the production function with respect to capital results in:

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<sup>3</sup> D. W. Caves, Christensen L. R. and Diewert W. E. (1982). “The Economic Theory of Index Numbers and the Measurement of Input, Output, and Productivity.” *Econometrica* 50: 1393-1414.

$$MP_K = \frac{dy}{dK} = \alpha AK^{\alpha-1}L^\beta = \alpha AK^{\alpha-1}L^{1-\alpha} = \alpha A(L/K)^{1-\alpha}$$

This is the change in output resulting from a unit change in capital holding all other factors constant. It is mostly measured in physical units and as a result, it is known as the marginal physical product. It exhibits diminishing marginal returns implying that when one continues to increase capital, its resultant effect is that output initially rises, however, there is a point where output will no longer rise but rather decrease.

The same differential with respect to labour results in:

$$MP_L = \frac{dy}{dL} = \beta AK^\alpha L^{\beta-1} = \beta AK^{1-\beta} L^{\beta-1} = \beta A(K/L)^{1-\beta}$$

The marginal product of labour is the change in output resulting from a unit change in labour “ceteris parabis” and it has a similar property as that of capital which has already been expounded.

The ratio of these two physical marginal products brings up a very significant property called the Marginal Rate of Technical Substitution (MRTS) or Technical Rate of Substitution (TRS). It measures the rate at which one input (say capital) can be substituted for the other (say labour) and maintaining the same level of productivity. It indicates the slope of the Isoquant (i.e. a graph that charts all the combinations of inputs mix that produce the same level of production) and at the point of equilibrium, it is (i.e. MRTS) equal to the ratio of the input prices.

It is expressed as:

$$MRTS_{L,K} = MP_L/MP_K = \beta A(K/L)^{1-\beta} / \alpha A(L/K)^{1-\alpha}$$

Finally, the average of output with respect to the respective inputs pose another significant concept of the C-D function – Average Product. Average product equals the units of output produced per unit of a factor of production while keeping other factors of production constant. There could be average products for all inputs. For example the ratio of output to capital results in the average product of capital. Also, the unit of output produced per unit of labour holding all other factors constant is the average product of labour. If a factor is more productive, its average product will be higher. On the other hand, the lower the average product, the less effective is the input.

### **3.4 Specification of Empirical Model**

In order to arrive at an appropriate estimation model for the purpose of this literature, we modified the traditional C-D model to include other variables of interest.

The theory of human capital put forward by Gary Becker explains human capital as the stock of knowledge or characteristics an individual has whether innate or acquired that contributes to his or her productivity. The theory asserts that workers can have different amounts of skills (human capital) as a result of differences in their innate abilities. Individuals can also invest in their stock of human capital through education, training, and medical treatment. Becker's view on this theory postulates that human capital increases the productivity of a worker in all tasks. The level of education of farm manager is used to capture the human capital.

The idea put forth by Mincer in the Mincer semi-logarithmic earnings function explains that wage income is a function of schooling and experience somewhat affirming Becker's human capital theorem. Thomas Emieux has argued that perhaps the model is "one of the most widely used models in empirical economics". It is therefore not surprising that Acemoglu (2011) adopted the Mincer's theory on earnings to provide a mapping from the human capital investments theory on

wages and modified it to provide a larger empirical literature on returns to education. The experience of manager caters for this concept of experience.

Labour economics put forth various theories of discrimination in the labour market. Among such theories are personal prejudice taste hypothesis developed by Gary Becker as well as Market and Statistical discriminations. Becker's theory is based on "taste" for discrimination. Within Becker's model, discrimination can arise from three different sources which are the employer, employee, and customer. Employer discrimination is the prejudice against employees by the employer. Employee discrimination arises when employees prefer to work with co-workers of a particular colour, race, sex or religion because they associate a disutility with working with members of the discriminated group. Customers as well may have a taste for discrimination by associating with certain producers on the grounds of sex, religion, race etc. Different approaches in measuring labour market discrimination have evolved over time. Some of the approaches include Oaxaca Decomposition, Discrimination coefficient method and Dummy variable approach which adopts the Mincerian semi-logarithmic wage equation in its estimation. The study, therefore, investigates if there exist gender disparities in performance among male managed poultry farms and female managed ones among poultry farmers located in Dormaa.

Organizational ecology encompasses a lot of theory fragments including age dependency and firm survival. A subsection of the theory includes liability of smallness (authored by Aldrich H. and Auster E.) and liability of aging. The theory of liability of smallness suggests that size matters, and the bigger the better. Smallness is associated with inadequate or lack of financial resource, difficulty in attracting skilled workforce, difficulty in meeting high-interest rate payment and many others (Aldrich and Auster, 1986). Smallness in this sense may have a negative effect on performance. A proxy for size used in this literature is the number of employees in the respective poultry farms.

A closely related theory is the liability of newness coined by Arthur Stinchcombe in 1965. Stinchcombe maintains that new firms are mostly inexperienced at the initial stage and as a result suffer from low average quality performance. However, if they manage to survive, their “experience learning curve” increases with time. The liability of newness again reasons that firms exhibit a decreasing monotonic behaviour with age however, failure rates are high in the early years of the firms’ lifecycle. A twist to this assertion is the liability of aging theory which avers that the risk of failure increases with age. This literature uses the age of poultry farms to depict the newness analogy.

The concept of absolute advantage and competitive advantage in international trade have explained how and why countries devote limited resource to the production of certain goods. In his publication in 1776, Adam Smith argued that a country, individual or firm is said to have an absolute advantage over others if, given the same amount of resources, it is able to produce greater quantities of a good or service than its competitors. A modification to this concept of absolute advantage is competitive advantage which incorporates opportunity cost to the earlier smith’s concept. A country's absolute advantage or disadvantage in a particular industry has an important role to play in the type of good(s) it produces. Similarly to firms, the advantage or disadvantage they possess may inform their speciality. The choice to specialise in the production of broilers, layers or a combination of the two could partly be explained by the concept of comparative advantage which such farms have. Trying to investigate whether the speciality of farms (whether broiler, layer or a combination of birds) play any significant role in the sales performance of poultry farms, we include speciality of farms to cater for this concept.

Rand and Torm (2011) concluded that formalization of a firm leads to an increase in the firm’s profit, investment and access to credit and as a result becoming formalized is beneficial not only

to the firm but also to the employees since it decreases the use of casual labour and improve the contract conditions of existing workers.

Again becoming an affiliate of an association could be argued from the resource-based view or the social-exchange view in organisational behaviour. The resource-based view sees an association as a resource that affiliated members tap into the rich flows of that resource. Such proponents for this view argues that resources have the potential to provide firms with sustainable competitive advantage (Barney, 1991). Goedhuys and Sleuwaegen (2001) noted that social capital (strategic alliances or association membership) that characterize SMEs is among the important factors influencing their performance. Similarly, the social-exchange view of association membership maintains that firms will choose and maintain alliances that maximize their rewards and minimize their costs. Members of the association can negotiate for exchanges between themselves which place them in a position to be more competitive than non-members.

As mentioned earlier, it is noteworthy that the C-D function has output as the dependent variable. However, this study uses weekly sales as an auxiliary for output due to the fact that poultry farms are multi-product firms (i.e. producing both eggs and chicken) and therefore the output component in the C-D function will be a make-up of two outputs which are eggs and chicken if adopted. However, the differences in the measurement of these two outputs pose a measurement challenge since getting a common measurement or merging the two distinct outputs will pose a challenge. Again, data availability on records of total production of eggs and chicken was a challenge but records of weekly sales of eggs and chicken were readily available. As a result of these constraints, weekly sales is used to measure output and also used as a proxy for performance.

Now eclectically infusing all the theories and concepts and building upon the C-D Model, the augmented C-D function becomes:

$$WS = \beta_0 E d^{\beta_1} E^{\beta_2} G^{\beta_3} A^{\beta_4} S^{\beta_5} Ss^{\beta_6} Sp^{\beta_7} F^{\beta_8} D^{\beta_9} \dots \dots \dots (3.1)$$

We now transform equation (3.1) into a semi-log equation. “Logarithmic transformation of variables helps to show influential points in very sharp manner and also corrects skewed variables into the right distribution toward normality” (Green, 2003).

The semi-log equation now becomes:

$$\ln WS = \beta_0 + \beta_1 Ed + \beta_2 E + \beta_3 G + \beta_4 A + \beta_5 S + \beta_6 Ss + \beta_7 Sp + \beta_8 F + \beta_9 D \dots \dots (3.2)$$

Now we substitute the variables in equation (3.2) with the variables that will be used for estimation and also transform it (i.e. equation (3.2)) into an equation conforming to the processes involved in estimating a panel model. The final semi-logarithm equation that will be used for estimation in the subsequent chapter is expressed as:

$$\ln Wsales_{it} = \beta_0 + \beta_1 educ_{it} + \beta_2 exp_{it} + \beta_3 gender_i + \beta_4 ages_{it} + \beta_5 size_{it} + \beta_6 sizesq_{it} + \beta_7 speci_i + \beta_8 formal_i + \beta_9 dpfa_i + \varepsilon_{it} \dots \dots \dots (3.3)^4$$

Where:

$\beta$ 's represent the coefficients in the multiple regression model.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9$  are the partial elasticities of weekly sales with respect to  $educ_{it}$ ,  $exp_{it}$ ,  $exp_{it}$ ,  $gender_i$ ,  $ages_{it}$ ,  $size_{it}$ ,  $sizesq_{it}$ ,  $speci_i$ ,  $formal_i$  and  $dpfa_i$  respectively.

- $\ln Wsales$  is the log of weekly sales of poultry farmers.
- $educ$  is the level of education of managers of the farms.
- $exp$  is the years of experience of managers of the farms.
- $gender$  is the gender of the manager (0 for female, 1 for male).

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<sup>4</sup> Note that variables with subscript “t” represents time varying variables whereas those without the subscript “t” are time-invariant variables.

- *ages* measure the age of the manager.
- *size* is the size of the poultry farm which uses number of employees as a proxy.
- *sizesq* caters for the curvilinear nature or the turning point of size.
- *speci* is a categorical dummy measuring the speciality of the farm (0 for layer, 1 for broiler, 2 for both).
- *formal* is a dummy which captures the formalization of farms (0 for non-formalized, 1 for formalized).
- *dpfa* is an abbreviation for Dormaa Poultry Farmers Association which is a binary (0 for non-member, 1 for member)
- $\epsilon_{it}$  is the stochastic error term.

### 3.5 Estimation Techniques

This study will employ quantitative technique to establish the determinants of sales performance among Dormaa Poultry farmers. Blaikie (2009) points out that quantitative research produces measurable and presentable outcomes in the form of statistics and numbers. As this study seeks to provide quantifiable measures of the determinants of performance among Dormaa Poultry farmers, quantitative technique is regarded most appropriate.

Panel data sets combine both time dimension and cross sectional dimension. Also known as longitudinal data sets, it gives more informative data, more variability and it is good for the study of more complicated models. The cross and time sectional dimensions increase the risk of heteroscedasticity and serial correlation associated with cross-sectional and time series data respectively. One of the many ways in dealing with such problems is to run a robust test which provides standard errors that are robust to heteroscedasticity and serial correlation. Equations for estimation in Panel analysis are typical of the form:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + e_{it}$$

Where  $Y$ ,  $X$  and  $e$  are the usual dependent, independent and error term respectively, “ $i$ ” represents the individual unit (firms, countries etc), and “ $t$ ” is the time periods.

Several techniques can be adopted to estimate equation (3.3) in order to achieve the first objective of this thesis. First among them is by assuming that all individual units are homogeneous (i.e. all poultry farms are assumed to be the same) and as a result estimate the pooled data using OLS. This is commonly called the Pooled Regression which ignores individual heterogeneity effect which at certain times could lead to wrong conclusions. One, therefore, needs to check whether pooling is appropriate (by testing for individual heterogeneity effect) before adopting this estimation technique in order to have reliable estimates.

In situations where there exist persistent differences between units (thus if there are reasons to believe that poultry farms differ among themselves), the error term will vary more systematically across such units (heterogeneity) and there is the need to improve upon the pooled model to account for such differences. An alternative to the pooled model which accounts for this persistent differences is the Random Effect (RE) model. This model strips off the individual heterogeneity or firm-specific effect “ $f_i$ ” from the error term and makes it truly random. If there are reasons to believe that differences across units explain the dependent variable (in this circumstance weekly sales of poultry farmers) and uncorrelated with other regressors, then it is more appropriate to use the Random Effect model. The equation for such estimation is of the type:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + f_i + e_{it}$$

The usual connotations hold.

On another hand, if all the earlier assumptions hold except that the individual heterogeneity term “ $f_i$ ” is correlated with other regressors, then sticking to the Random Effect model may lead to unreliable estimators. It is therefore advisable to use the Fixed Effect (FE) model in such circumstances. The FE model uses within and first-difference transformations to break the correlated effect for the model to be free from endogeneity bias. These transformations however eliminates all time-invariant variables and for which reason the RE model is preferred to the FE model since it only allows for time varying variables. In order to obtain estimates for time-invariant variables, the Hausman-Taylor estimator can be employed since it offers an alternative to estimating static panel data models. In situations of choosing a model – thus choosing between FE and RE that produces efficient and consistent estimates, the Hausman test (1978) provides an efficient selection criteria. That is the Hausman test helps in choosing between the FE and RE models.

The final technique is the between effect estimator. This estimator feeds on the cross-sectional dimension of the data (i.e. the differences between units and in this situation poultry farms). What it does is that it uses OLS to regress the averages of the dependent variable on the individual averages of the independent variables. Unlike the FE model which thrives on the time-series dimension in the data, the between effect estimator uses the cross-sectional information in the data. This estimator provides a clearer spectrum to identify and observe the differences between units (e.g. poultry farms).

To achieve objectives two and three, we employ the Blinder–Oaxaca decomposition which has been used in several studies mostly related to the differences in labour-market outcomes resulting from disparities in groups such age gender, colour etc. The method decomposes the mean differences in the dependent variable (for instance wage which has been widely used for such analysis) based on linear regression models in a counterfactual manner. The differential in the

dependent variable is divided into two groups: a part that is “explained” by the differences in productivity characteristics or the independent variables, and a residual part that cannot be “explained” or accounted for within the estimated model. The unexplained or coefficient effect is what is normally interpreted as a measure of labour market discrimination. Although most applications of this technique have been used in the field of labour to determine labour market discriminations, it is also useful in other fields to study group differences in any (continuous and unbounded) variable. A good example is the study by O’Donnell et al. (2008) in their analysis of health inequalities by poverty status.

### **3.6 Diagnostic Tests**

The issue of serial correlation and heteroscedasticity raises concerns when dealing with data with both time and cross dimensions. Heteroscedasticity is prevalent in cross-sectional data whereas serial correlation is prevalent in time series data. For sure panel data possess both time and cross dimensions and as a result, the problem of serial correlation and heteroscedasticity are likely to be encountered. Serial correlation is not much of a problem in this study due to the “shortness of the data” used in this study, however, heteroscedasticity is. Heteroscedasticity arises when the variance of the error terms is not constant. Serial correlation, on the other hand, ensues when successive values of the random error term are not independent.

Some writers have argued that FE and RE models’ estimators are regarded inconsistent and inefficient when snared with heteroscedasticity and autocorrelation (Baltagi, 2008; Greene, 2003 & Wooldridge, 2002). Baltagi (2008) further argued that the FE and RE models operate under strict assumptions of the absence of heteroscedasticity, serial correlation etc. In view of this, it is important to deal with the problem of heteroscedasticity and serial correlation.

Although there are several ways of dealing with these problems in panel data, we consider one of the simplest and most widely used approaches in dealing with these problems which is the robust standard errors. The resultant standard errors of the regression coefficients that are generated under this technique are robust to heteroscedasticity and serial correlation making it suitable for the construction of confidence interval and the testing of hypothesis. The standard errors that are produced are sometimes referred to as “clustered standard errors”. The study, therefore, runs all our regression models with the robust standard errors to deal with these problems.

### **3.7 Description of Variables and Expected Sign**

This sub-section considers all the proposed factors that affect or has the potential to affect sales performance of Dormaa poultry farmers. The independent variables are classified into two segments: factors relating to the personal characteristics of the manager and factors relating to the business climate. Each of the proposed factors and the expected signs based on earlier findings by different authors is discussed.

#### **3.7.1 Dependent Variable**

##### **Weekly Sales:**

Weekly Sales is the dependent variable that is used in this literature. Several variables have been adopted by different authors to measure performance. Lerner, Brush, and Hisrich (1997) identified some of the frequently used measures for performance as the size of business (number of employees), profitability, Gross revenue, and Income. However, Brown et al. (1995) asserted that performance is predominantly measured in terms of financial performance which could be profitability, sales, and market share. Stanger (2000) used sales as a proxy for performance which he described as the most commonly reported indicator for performance that is well defined and understood as well as honestly reported by all respondents. He further argued that most private

firms are mostly unwilling to release sensitive data such as their net income or returns on investment. In this regard, this study as well adopts weekly sales of Dormaa Poultry farmers as a suitable measure of performance.

### **3.7.2 Independent Variables**

The explanatory variables will be categorized into personal factors and factors arising from the business climate (Thibault, 2001). The personal factors are: Educational level of manager, years of experience and gender of manager. The business climate factors are: Age of farm, number of employees, speciality, registration status of farms and association membership.

#### **Personal Factors**

The personal factors comprise all the personal characteristics encompassing the owner or manager of the various poultry farms. The three variables in this respect that will be considered for this study are: educational level of manager, years of experience of manager and gender.

#### ***Educational Level of Manager:***

In order to observe whether the level of education of managers play any role in the outcome they achieve, the variable “educational level of the manager” was introduced to investigate this assertion. Managers or owners of firms may have diverse levels of education ranging from basic level to tertiary level of education. Some business owners may even be illiterates with no formal education. Thibault (2001) identifies that although some business owners are highly educated and successful others are equally successful but less educated with no high school certificate. He further argues that the success of a manager or owner in many instances depends on the individual in question. Other writers argue that the level of education of managers play a crucial role in the performance of such businesses.

Whiles some authors have established a positive relationship between the level of education and business performance, others have achieved different outcomes. For instance, Akinboade (2015) established that increasing levels of education of managers of Cameroon's manufacturing and retail sector had a positive effect on performance only up to the secondary level beyond which performance began to dwindle. Similarly, Martey et al. (2013); Wasilczuk (2000); Dawit (2010) found a positive relation between years of education and performance. Alternatively, Gizachew (2005) established a negative relation between household education and dairy supply (performance) in Ethiopia. These results suggest that the link or relationship between education and performance are at best ambiguous.

#### ***Years of Experience of Manager:***

The number of years a manager has spent on a particular occupation may be crucial for the survival of such firm. While some managers may be new and with no or little experience in their field of work, there are others who prior to their current occupations have served years in the same or similar industry. Such managers may have an upper edge over their inexperienced counterparts since they may have learnt from past mistakes which are likely to be encountered in their current work. Also, managers with prior work experience may have built up competitive advantage, competence and reduce their rate of committing errors through their past experience.

Several studies seem to establish a positive relation between performance and experience. Among them are the works of Holloway et al. (1999), Mutandwa et al. (2015), Martey et al. (2013) and Akinboade A. (2015). These authors conducted different research in different geographical regions including Cameroon, Ghana, Kenya and Rwanda and arrived at a positive correlation between performance and the level of experience of managers. This, therefore, suggests that there is a higher probability for owners with prior work experience to perform better than those without or with little experience.

***Gender:***

The gender orientation of a manager may have implications on their outcomes as suggested by some writers based on their findings. Some hold that mostly female managers are discriminated against in managing of firms in several dimensions including opportunities to expand, access to loans and financial support, sales among others. Some studies have indicated that small businesses which are owned and managed by males generally perform better than similar small businesses owned and managed by females.

Coleman (2000) discovered that male managers have access to huge capital which makes their firms larger and more profitable than their female counterparts. This, therefore, reduces the risk associated with male borrowers. The exact contrast was observed on female-owned businesses which make them less competitive in terms of profitability, success, access to loan etc. Coleman then concluded that based on these opportunities available to male owned and managed businesses, they are placed in a better position to outperform their female counterparts.

Similar to the work of Coleman, Spilling & Berg (2000), Heck, Rowe and Owen (1995) and Orser and Foster (1992) identified that male owned and managed businesses are generally greater, bigger, contribute more to their respective national economies, generate and earn more income and outperform female managed ones. Other studies that have considered gender comparisons seem to share a similar view that male managed businesses perform better than female managed business.

**Business Climate Factors**

The business climate factors refer to all the factors that result from the happenings of the business environment. It comprises all external forces that affect a business and its operations. The factors

under this category to be considered include: Age of farm, the number of employees, speciality, registration status of farms and association membership.

***Age of farm:***

While some scholars agree that the age of a firm determines its growth, others hold opposing view to this assertion. Proponents for age as Rose, Ismail and Abdullah (2010), Gaur and Gupta (2011) and the like hold the view that older firms perform better than relatively younger ones. Persson (2004) advanced that the rate at which a firm survives increases with age, therefore, the older the firm is, the higher the probability of survival since the hazard rate reduces with time for such older firms (Audretsch, 1991). Other writers who operate in like manner further elaborate that older firms are able to achieve and enjoy economies of scale due to sufficient managerial resources and expert hands in their area of work. Others further report that experience and knowledge comes with age, and older firms are resolute to changing trends in the business environment, are innovative, can take risk and expand their operations putting them in a better position than their counterparts. Firms that have established such experience due to their lengthy years of existence in their respective businesses will be in an advantageous position to improve their overall performance.

On the flip side lies opposers to age. These writers make conflicting remarks stating that older firms mostly own outmoded equipment that may impede their ability to efficiently operate. Also, old firms are not flexible enough to quickly adjust to changing trends in business environment and their rigidities impede their growth and progress making them less competitive. For instance, the review of Felekoglu (2007) has shown that younger firms perform better in terms of innovation than their older fellows. Several authors like Kapelko (2006), Huego and Jaumandreu (2004) have as well established that younger firms perform better than older firms and therefore hold the view that firm performance deteriorates with age.

***Number of employees:***

Number of employees was adopted as a proxy for farm size. While some authors hold the view that the bigger the better, others oppose to this view. Proponents for bigger size suggest that there is the potential to encounter some employees who will bring on board new opportunities and new ideas. Those against this counter with the fact that sometimes bigger size is characterised with waste and as such the smaller the better.

In the work of Martey et al. (2013) on the Performance and Constraints of Small Scale Enterprises in the Accra Metropolitan Area of Ghana, it was discovered that the number of employees (size of the firm) had a positive relation with performance. Likewise, Mutandwa et al. (2015) found that the size of an enterprise increased annual net income in Musanze district in the Northern Province of Rwanda. These findings seem to support the assertion that indeed size matters and the bigger the better.

To estimate the turning point of size, the literature introduces an additional variable which is obtained by squaring size. The rationale for this inclusion is to estimate the curvilinear relationship of size as put forward by Tabachnick & Fidell (1996). They hold the view that, increasing employment will increase sales performance up to a point and thereafter level up suggesting that there is some form of diminishing returns to size.

***Speciality:***

Speciality captures whether the poultry farm specializes in the production of layers or broilers or a combination of the two. While some farmers prefer engaging in one of the two breeds based on their personal reasons, (which may include the low sale of for instance, broilers due to its seasonal nature in terms of sales) others prefer to rear the two breeds in their farms. It is believed that the

type of poultry reared may influence the sales made from the farm and this study tries to investigate this phenomenon.

As identified earlier in the publication of Adam Smith's *Wealth of Nations*, the advantage or disadvantage, as well as the resources firm poses, may inform their speciality. The choice to specialise in the production of either broilers or layers or a combination of the two could partly be explained by the concept of comparative or absolute advantage which such farms have.

In terms of empirical work, the study conducted by Anang, Yeboah, & Agbolosu (2013) on the profitability of broiler and layer production in the Brong Ahafo region of Ghana revealed that, despite the numerous challenges facing the sector, both broiler and layer production were found to be equally profitable.

***Registration status of farms (Formalization):***

A rapid growing feature of many developing countries including Ghana is the informal nature of a large segment of their market. Aside the heterogeneous nature of the informal sector, it is generally associated with low level of production, limited security, poor working conditions for employees, and obviously tax evasion which some writers argue as the leading cause for them remaining informal. Many of the literature perceive informality as an involuntary condition that crops up due to either excessive bureaucratic regulations or weaknesses of the legal system (Dabla-Norris et al., 2008). However, more recent research have shown that the decision not to register a firm or business is often a conscious choice that is made due to the "attractiveness" informality pose as against formality.

Although, at certain times formalization is seen by firm owners or managers as a means of being captured for taxation purposes which may seem to deter them from doing so especially from this part of the world, it may also come with several advantages which include access to credit,

safeguarding of business name, obtaining legal protection among others. Thus, unveiling the overwhelming advantages of formalization could lure firms not excluding workers, to shift out of informality to becoming formal.

Farrell (2004) through a multi-country study concluded that informality has a negative effect on the productivity of a firm. Similarly, Fajnzylber et al. (2006) showed that formalizing increases business profits which later was confirmed by Rand and Torm (2011) in their research in Vietnam. A further review of literature seems to suggest a positive correlation between formalization and performance.

***Association membership:***

Similar to formalization, association membership comes with several opportunities and advantages which include networking, access to information, improved business reputation and public trust among others. This notwithstanding, some poultry farms voluntarily opt out of the DPFA due to several reasons known to them. Generally, it is believed that members of the poultry association experience higher productivity and sales due to some of the opportunities opened to them as members of the association of which some have already been identified.

For instance, Nahapiet and Ghoshal (1998) established that associations facilitated the creation, as well as the sharing of intellectual capital among firms and that opting out of it, may have an adverse effect on performance. In a like manner, Cooker et al. (2005) demonstrated the existence of a strong and positive correlation between association membership and the performance of member firms in terms of innovation and business growth.

Table 3.3 below presents a summary description of all variables employed for this study and the expected relationship between the dependent and independent variables.

Table 3.3 Expected Relationship between the Dependent and Independent Variables

VARIABLE	DESCRIPTION	EXPECTED RELATIONSHIP
<b>DEPENDENT VARIABLE</b>		
Weekly Sales	It is used as a proxy for Performance.	N/A
<b>INDEPENDENT VARIABLE</b>		
<i>Personal Factors</i>		
Educational Level of Manager	Captures the number of years of education of the manager.	+/-
Experience of Manager	Measures the number of years of experience in the poultry business.	+
Gender of Manager	Measures the sex of the managers.	Males > Females
<i>Business Climate Factors</i>		
Age of farm	Measures the years of existence of the farm.	+/-
Number of employees	This variable is used to capture the size of farms.	+
Speciality	Denotes if a farm has specialized either in layers or broilers or both.	+/-
Formalization	Captures whether a farm is registered or otherwise.	+
Association membership	Denotes whether a farm or manager belongs to the DPFA or not.	+

Source: Author's Compilation.

## CHAPTER FOUR

### DATA ANALYSIS AND DISCUSSION OF RESULTS

#### 4.1 Introduction

This chapter is structured into two main segments. The first aspect analyses the data set, specifically, the demographics and the descriptive statistics of the data set. This is then followed by an extensive discussion of the estimation result obtained from the empirical model to address the objectives specified in the beginning chapter.

#### 4.2 Demographics of the Respondents

This sub-section reports the demographics of the sample drawn from the population of farmers from the Dormaa Municipality. The frequencies of the dependent and independent variables have been presented in percentages and graphs. The “xtsum” Table provides a detailed statistical information of the variables ranging from the variations for overall, within and between variables to their means. A complete “xtsum” table comprising of both the time-varying variables and time-invariant variables of the data set is presented in Appendix 3. All compilations were done by the author. The summary results are presented below.

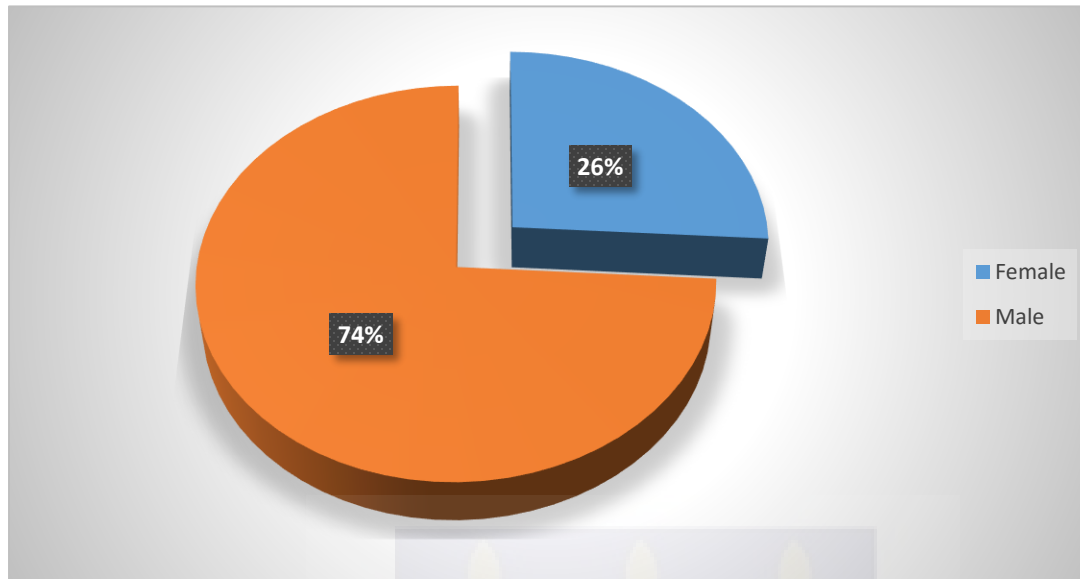
##### Gender of manager/owner

The data showed that the managers who were surveyed were predominantly males (74%), with females accounting for 26% of the total sample.

Table 4.1 Gender of Manager

<b>Gender</b>	<b>Frequency.</b>	<b>Percentage.</b>
<b>Female</b>	48	26
<b>Male</b>	137	74
<b>Total</b>	<b>185</b>	<b>100</b>

Figure 4.1 Gender of Manager



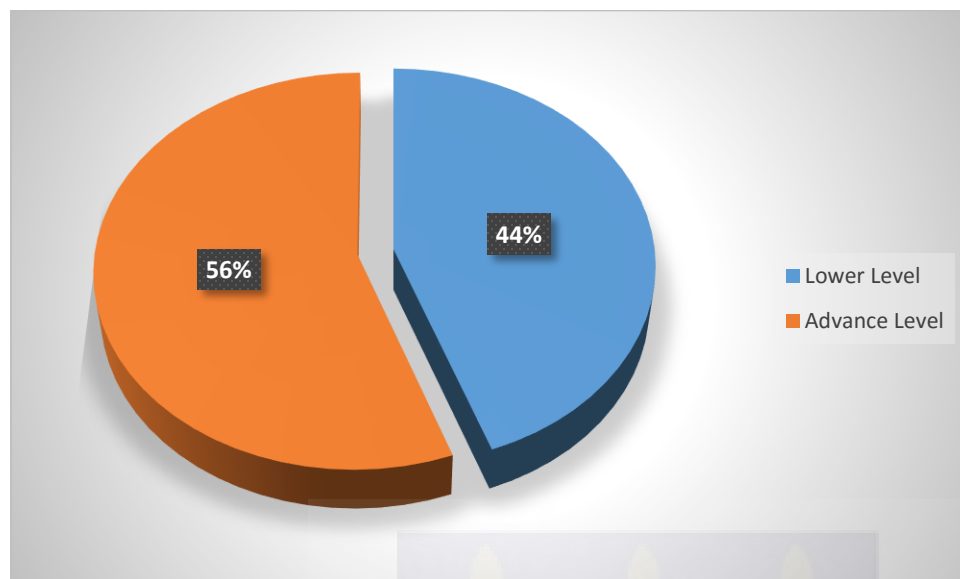
### Educational Level of Manager/Owner

The educational level of the manager was categorized into five main groupings (No Education, Non-formal, Primary, Secondary and Tertiary levels of education). A little manipulation was done to this variable by reclassifying all educational level above primary level as advance while any level from the primary level and below as lower level. It can be observed that 56% of the managers had advance level of education (either Secondary or Tertiary education) while 44% had lower level education (Below Secondary level).

Table 4.2 Educational Level of Manager

<b>Educational Level</b>	<b>Frequency.</b>	<b>Percentage.</b>
<b>Lower Level</b>	83	44
<b>Advance Level</b>	104	56
<b>Total</b>	<b>187</b>	<b>100</b>

Figure 4.2 Educational Level of Manager



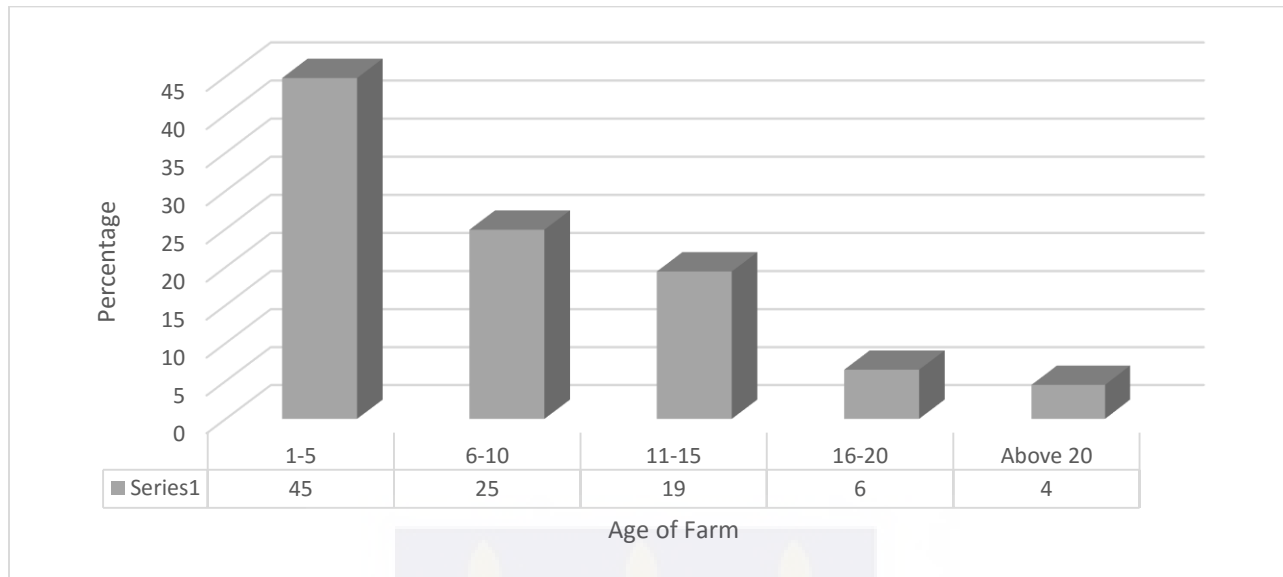
### Age of Farm

There was a wide range of ages of the various farms. The age bracket spanned from year one to year 34. Some of the farms had been in existence for as long as 34 years either passed down through family or transferred to new ownership. The age categorization was done in a cluster of five-year span ranging from 1 to 5, 6 to 10, 11 to 15, 16 to 20 and above 20 years. It can be observed that majority of the farms (45%) were young. 25% fell within the age bracket of six and ten years, 19% between eleven and fifteen while 6% fell between sixteen and twenty years. Only 4% had attained the age of 20 or more.

Table 4.3 Age of Farm

Age Range	Frequency.	Percentage.
<b>1-5</b>	90	45
<b>6-10</b>	50	25
<b>11-15</b>	39	19
<b>16-20</b>	13	6
<b>Above 20</b>	9	4

Figure 4.3 Age of Farm



### Experience of Manager/owner

The level of experience was done in a similar grouping as the age of farms. The categorization ranged from no experience to above 20 years of experience. 36% had less than six years of experience. 27% fell between six to ten years of experience whereas only 6% had more than twenty years of experience.

Table 4.4 Experience of Managers

Age Range	Frequency.	Percentage.
<b>1-5</b>	74	36
<b>6-10</b>	55	27
<b>11-15</b>	47	23
<b>16-20</b>	15	7
<b>Above 20</b>	12	6

Figure 4.4 Experience of Managers



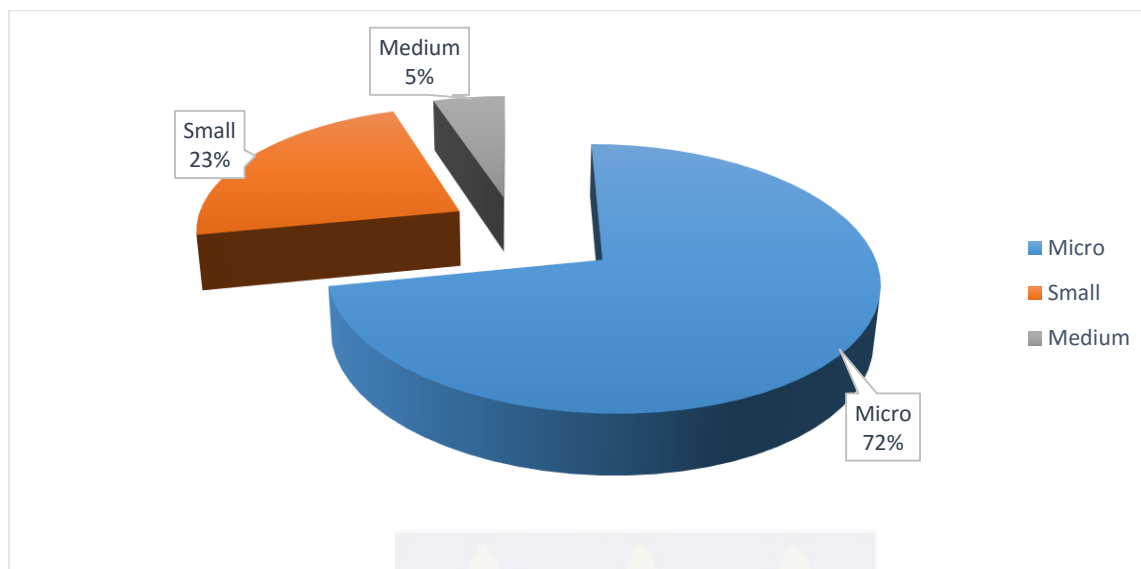
### Size of Farm

The categorization for size was a context-based one employed by many Ghanaian authors which adopt the number of employees as the basis. A micro enterprise has less than 6 employees, small enterprise has less than 30 but more than 5 employees and a medium enterprise has less than 99 employees. The data showed that 72%, 23%, and 5% fell within micro, small and medium categories respectively.

Table 4.5 Size of Farm

Scale	Frequency.	Percentage.
Micro	156	72
Small	50	23
Medium	11	5

Figure 4.5 Size of Farm



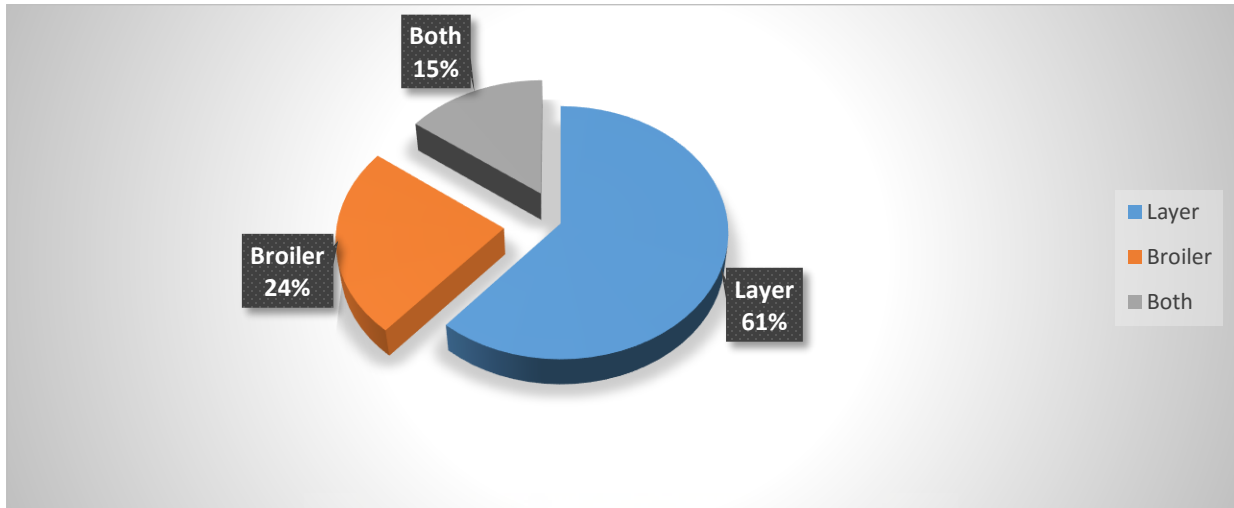
### Speciality of Farm

Most of the farms were engaged in layer birds (61%) whereas 24% were engaged in broilers. However, 15% were involved in the rearing of both layer and broiler birds. One reason to buttress the rationale behind why most farmers engaged in the production of layer birds is that the layer birds produce eggs every day which boosts their sales, unlike the broilers who take 8 weeks to be matured for harvesting. Again, the sale of broiler birds was typically seasonal and most of the farmers preferred engaging in layer birds during the off-season in order to keep up with sales.

Table 4.6 Speciality of Farm

Speciality of Farm	Frequency	Percentage
Layer	120	61
Broiler	47	24
Both	29	15

Figure 4.6 Speciality of Farm



### Formalization of Farm

From the table, it can be observed that 57% of the farms were formally registered whereas 43% were not registered as at the time the survey was conducted.

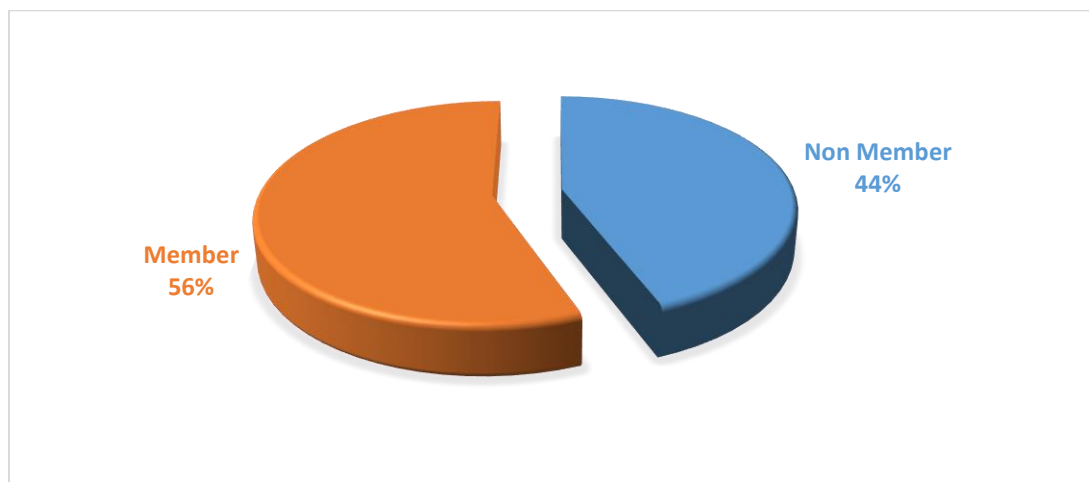
Table 4.7 Formalization of Farm

Formalization of Farm	Frequency	Percentage
Not Registered	97	43
Registered	126	57

### Association Membership Status

It can be observed that 56% of the farms were registered with the Dormaa Poultry Farmers Association (DPFA) while 44% were not members of the association.

Figure 4.7 Association Membership Status



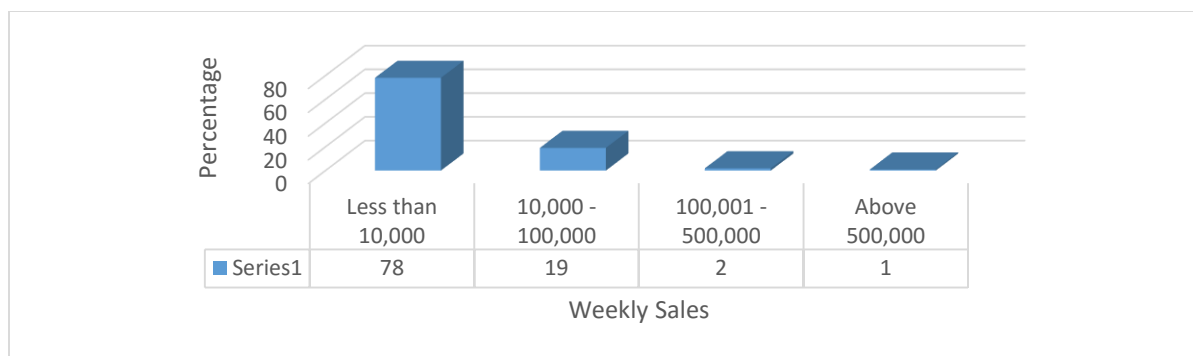
### Weekly Sales

The weekly sales variable was categorized into clusters as can be observed from Table 4.9 under the wage range column. A chunk of the farms (78%) made weekly sales of less than GH¢ 10,000. Only 1% made above GH¢ 500,000 a week.

Table 4.8 Weekly Sales

Wage Range (GH¢)	Frequency.	Percentage.
Less than 10,000	168	78
10,000 - 100,000	41	19
100,001 - 500,000	4	2
Above 500,000	2	1

Figure 4.8 Weekly Sales



## 4.2 Descriptive Statistics

The total number of observation is two hundred and seventy-seven (277) with one hundred and eighty-four (184) number of groups. The data is a short panel data with two time periods. The log of weekly sales vary from 2 to 14 with an average of 8. There was slightly more between variations than there was for within variation for this variable.

Age of farm spanned from 1 year to 34 years with an overall average age of 8 years. There, however, seem to be a wide variation between different farms (6.1) than there was within a particular farm (0.4) overtime. This suggests that one farm could be as young as a year old while another could be as old as 34. The overall variations (6.3) is greatly explained by the variations existing between farms.

The size of farms measured as the number of employees ranged from a single employee to 80 with an average size of 7 workers and an overall deviation of 13. Similarly to the age of farm, a major part of the overall variation is explained by the between variations rather than the within variations. The between variation was as high as 11 whereas the within variation is only 3.

The educational level of managers recorded the least overall variation and a less than one percent between and within variations. Implying that there were not many variations both between and within poultry farms in terms of educational level of managers. The level of education had a minimum of one and a maximum of five. In other words, the level of educational ranged from no education to tertiary level.

Experience spanned from zero or no experience to 34 years of experience with an average of 10 years. The overall variation is 7 with the variation between farms taking a greater share (approximately 7) of it.

Generally, there is wide between variations than variations within. The size of farm has the greatest variation (13) with the level of education having the least variation (0.9) as can be observed from Table 4.10. It will, therefore, be prudent to have an estimated result for the between effect in order to have a better understanding of the variations existing between farms. A complete table for the descriptive statistics can be found in Appendix 3.

Table 4.9 Descriptive Statistics

Variable		Mean	Std. Dev.	Min	Max
<b>Log of Weekly Sales</b>	overall	8.168913	1.486608	1.791759	13.79531
	between		1.213438	4.248495	11.47454
	within		0.8283844	4.946053	11.39177
<b>Age of Farm</b>	overall	8.144404	6.309707	1	34
	between		6.112975	1	33.5
	within		0.4082483	7.644404	8.644404
<b>Size of Farm</b>	overall	7.299639	12.91193	0	80
	between		11.3078	1	74.5
	within		2.903958	-12.7004	27.29964
<b>Level of Education</b>	overall	3.6787	0.8552881	1	5
	between		0.8553937	1	5
	within		0.1276885	2.638989	4.638989
<b>Experience</b>	overall	9.787004	6.740112	0	34
	between		6.564102	0.5	33.5
	within		0.9048981	2.287004	17.287

### 4.3 Estimation Models

As already mentioned, three main approaches can be employed in estimating panel data equations of this kind. These are the Pooled OLS, the Fixed Effect, and the Random Effect Models. We first estimate the equation by employing all three models mentioned above. The estimation results are provided in Table 4.10 below.

Table 4.10 Pooled, Random, and Fixed Effects estimations: Dependent Var. (Log of Weekly Sales)

	<b>Pooled OLS</b>	<b>Random Effect</b>	<b>Fixed Effect</b>
Association Membership	0.374** (0.181)	0.374** (0.176)	-0.062 (0.309)
Age of Farm	-0.018 (0.020)	-0.018 (0.018)	-3.165*** (0.274)
Size of Farm	0.116*** (0.020)	0.116*** (0.020)	0.109* (0.056)
Size Square	-0.001*** (0.000)	-0.001*** (0.000)	-0.001 (0.000)
Formalization	0.323** (0.162)	0.323** (0.160)	0.278 (0.390)
Speciality	-0.139 (0.107)	-0.139 (0.105)	0.002 (0.459)
Level of Education	-0.311** (0.155)	-0.311** (0.151)	0.666* (0.354)
Experience	0.006 (0.019)	0.006 (0.018)	0.108* (0.060)
Gender	0.041 (0.164)	0.041 (0.158)	2.283*** (0.274)
_ltime_1	0.546*** (0.169)	0.546*** (0.169)	3.651 (.)
Constant	7.171*** (0.207)	7.171*** (0.205)	28.449*** (1.868)
Observations	277	277	277
R-squared	0.34		0.25
Number of id		184	184

*Robust standard errors in parentheses*

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Source: Author's computations using Stata 13

#### 4.4 The Hausman Test and the test for Time Effect

We now conduct the Hausman test to assist in selecting the estimation whose parameters are consistent and efficient. Also, we test for the significance of time in order to decide whether time is of the essence. These two results are presented in Tables 4.11 and 4.12 respectively.

In the case of the Hausman test, the p-value (0.5420) is significantly greater than the 5% levels of significance implying that the alternate hypothesis is strongly rejected. This implies that the results of the RE is preferable to that of the FE.

Table 4.11 Hausman Test for Fixed effects and Random effects

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{chi2(9)} &= (b-B)' [(V_b - V_B)^{-1}] (b-B) \\ &= 7.92 \\ \text{Prob} > \text{chi2} &= 0.5420 \end{aligned}$$

Also from the result of the test for the significance of time, since the prob-value is less than the 5% significance level, we refuse to accept the null hypothesis of non-significance of time. This, therefore, suggests that time is significant and needs to be employed in our estimation models.

Table 4.12 Testing for the Significance of Time

`_itime_1 = 0`

$$\begin{aligned} F(1, 266) &= 10.41 \\ \text{Prob} > F &= 0.0014 \end{aligned}$$

Now there is the need to decide also between the Pooled OLS and the RE model. The Breusch and Pagan Lagrangian multiplier test will help in deciding between the two models. It can be observed from Table 4.13 that, the p-value from the test (1.0000) is significantly greater than the 1% and 5% significant levels and as a result, we refuse to accept the RE model over the Pooled OLS. Implying that the OLS estimators are consistent and efficient.

Table 4.13 The Breusch and Pagan Lagrangian Multiplier Test for Random Effects

Breusch and Pagan Lagrangian multiplier test for random effects

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<code>lwsale[id,t] = Xb + u[id] + e[id,t]</code>		
<b>Estimated results:</b>		
	<b>Var</b>	<b>sd = sqrt(Var)</b>
<code>lwsale</code>	2.210002	1.486608
<code>e</code>	1.710816	1.307982
<code>u</code>	0	0
<b>Test: Var(u) = 0</b>		
	<code>chibar2(01) =</code>	0.00
	<code>Prob &gt; chibar2 =</code>	1.0000

---

As stated earlier, the descriptive statistics of the data showed high between variation in the data and this has necessitated the decision to employ the between effect estimator to tell the true dynamics of the data. The final estimation results are presented in Table 4.14 below.

Table 4.14 Estimation Result

	<i>Pooled OLS</i>	<i>Between Effect</i>
<i>Association Membership</i>	0.374** (0.181)	0.496*** (0.184)
<i>Age of Farm</i>	-0.018 (0.020)	-0.020 (0.019)
<i>Size of Farm</i>	0.116*** (0.020)	0.111*** (0.026)
<i>Size Square</i>	-0.001*** (0.000)	-0.001*** (0.000)
<i>Formalization</i>	0.323** (0.162)	0.273 (0.187)
<i>Speciality</i>	-0.139 (0.107)	-0.119 (0.118)
<i>Level of Education</i>	-0.311** (0.155)	-0.318** (0.154)
<i>Experience</i>	0.006 (0.019)	0.015 (0.017)
<i>Gender</i>	0.041 (0.164)	-0.107 (0.174)
<i>_itime_1</i>	0.546*** (0.169)	0.442* (0.265)
<i>Constant</i>	7.171*** (0.207)	7.226*** (0.230)
<i>Number of id</i>	184	184
<i>Observations</i>	277	277
<i>R2-Within</i>		0.1585
<i>R2-Between</i>		0.3907
<i>R2-Overall</i>	0.3436	0.3389

***Robust standard errors in parentheses***

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Source: Author's computations using Stata 13.

### **Objective 1**

The results show that in both models, Association membership, Size of farm and the Level of Education are significant variables influencing sales performance. Time is as well significant under both models but at different levels of significance just as Association membership. The Formalization of farm is only significant under the Pooled OLS but otherwise for the Between Effect model.

For the Pooled OLS, being a member of the Dormaa Poultry Farmers Association significantly increases weekly sales by 37.4%. This, therefore, means that Association members experience a 37.4% higher weekly sales than non-members. This result is not quite surprising as predicted by social network theory. According to this theory, the existence or absence of networks in the form of membership of associations plays an influential role in the performance of businesses. Aldrich and Zimmer (1986) advanced that entrepreneurship is either promoted or hindered through this complex network of social relationships. Business associations or memberships provide certain benefits in the form of moral support and advisory services, access to information, deterrence to competition, and sometimes members collude in setting prices or policies to their advantage. These benefits could be the reason behind the differential performance between members and non-members.

Similarly, formally registered farms experience a 32.3% higher weekly sales than non-registered farms. Rand and Torm (2011) concluded that formalization of a firm leads to an increase in the firm's profit, investment and access to credit. Being formalized comes with its own benefits that may translate into sales performance. Formalization boosts firm's status, give them more recognition and also positions them to benefit from government interventions. Rand and Torm (2011) again asserted that formalization decreases the use of casual labour and improve the contract conditions of existing workers. When workers have such improved contract conditions,

they may develop a positive attitude towards work and exert more effort on delivering their task. All these together could translate into higher sales for the formally registered poultry farms.

The size of farm significantly increases weekly sales by 11.6%. This suggests that each additional employee generates approximately 12% increment in weekly sales. This upward trend, however, does not perpetually continue. Each additional worker hired brings along some type of resource or talent which if properly utilized may add value to the business. The resource or skill could be the experience such worker had from their previous work, efficiency in delivering of tasks, providing contact to potential customers among others. However, owners or managers are more likely to continue hiring more workers especially when they forecast growth (Thibault, 2001). The larger size of employees could lead to specialization which may initially increase performance but eventually cause a downward trend as put forth by the law of diminishing returns. Marc Thibault (2001) explains that employees are resources and that if effectively cultivated can generate greater sales revenue for any business. However, there is a point at which each additional employee will no longer contribute to the sales generated by the firm. This is the point of diminishing returns that must be recognized by businesses on an individual basis. In this situation, the size square which shows the curvilinear nature of rise in weekly sales due to farm size shows that beyond a certain point of expansion weekly sales begin to drop by 0.1%.

Interestingly, managers with advance or higher level of education make a 31.1% less of weekly sales as compared to those with lower level of education. Simply put, higher levels of education of managers is associated with lower sales. This is counter intuitive to the Human capital theory which suggests that the abilities and knowledge acquired by individuals are likely to be rewarded with higher earnings in the labour market (Becker, 1964). Again it opposes some literature and studies which concluded that business managers with higher levels of education set higher growth levels for both themselves and their businesses (Heck, Rowe, & Owen, 1995, Wasilczuk, 2000).

One possible reason accounting for this could be inexperience on the part of the managers of the farms. As it was observed from the demographics of the data, majority of the managers (36%) were inexperienced (i.e. their level of experience was less than 5 years) although most of them had an advance level of education (56%). This means that the greater proportion of “learned managers” were inexperienced in their field of operations. Quinones et al. (1995) and Sweetland (1996) explained that the positive effect of human capital investments (higher levels of education) on individuals’ career earnings and the earnings of firms as a whole may be more observable in the long run. For example, a university graduate may not be able to fully apply what he or she has learned in school to the work setting during the stressful school-to-work transition (Ng & Feldman, 2007). However, when given time they become fully integrated and conversant with the work environment and are able to apply their knowledge and ability to effect the activities of the firm. In such circumstance, the beneficial effects of higher education on productivity might become more observable.

The OLS model explains 34% of the overall variations. Size is significant at all the alpha levels but Association membership, Formalization and Educational level are significant at 5%.

For the Between Effect model, the coefficients for the association membership, size of farm and level of education are similar to the OLS coefficients in terms of direction but differ in magnitudes.

For instance, association members this time experience a 49.6% higher sales than non-members.

Again, an additional employee averagely increases weekly sales for an individual farm by 11.1% however just as said earlier, there is a point where diminishing returns set in and individual farm managers must be aware of this happenings.

Similarly to the earlier result, managers with an advance level of education make a 31.8% less weekly sales as compared to those with lower level of education. The results show that 39% of the

variations existing between farms are explained by this model whereas the overall variation is 34%. All these explained variables with the exception of the Educational level of managers are significant at all levels. Educational level is only significant at 5%. Time under this model is as well significantly positive.

Now, the Blinder-Oaxaca decomposition technique is used to investigate whether there are differences in weekly sales of farms (performance) resulting from gender disparities of managers, formalization status of farms and membership affiliation.

Table 4.15 Blinder-Oaxaca Decomposition of the Pooled OLS model

	<b>Gender</b>	<b>Formalization</b>	<b>Association</b>
<b><i>Differential</i></b>			
Prediction_1	8.193646*** (.1074027)	8.545991*** (.1226525)	8.561484*** (.1210094)
Prediction_2	8.094353*** (.1699356)	7.569817*** (.1105773)	7.572917*** (.1169532)
Difference	.099293 (.2010309)	.976174*** (.1651393)	.9885669*** (.1682894)
<b><i>Decomposition</i></b>			
Endowments	.127127 (.2276161)	8.067891 (7.196252)	-2.490675 (2.242453)
<i>Explained</i>			
Coefficients	.013815 (.1748083)	.4133201*** (.1750642)	.510307*** (.1765639)
<i>Unexplained</i>			
Interaction	-.041649 (.2038365)	-7.505037 (7.184282)	2.968934 (2.259098)

*Note: Robust standard errors reported in parenthesis. \*, \*\*, \*\*\* indicate significance at a 10 percent, 5 percent and 1 percent level, respectively.*

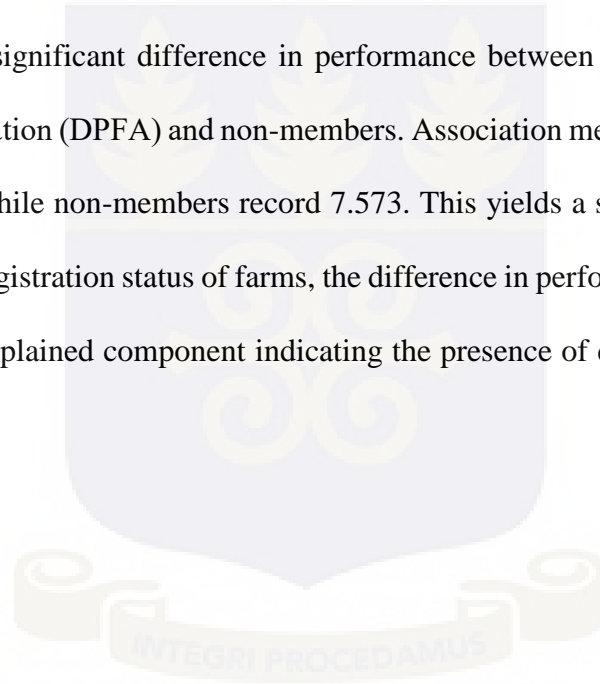
Source: Author's computations using Stata 13.

### **Objectives 2 and 3**

The results from the Blinder-Oaxaca decomposition confirms the initial outcome from the Pooled OLS result on the selected variables. The decomposition output reports the mean predictions by groups and their difference in the first panel. As can be observed, the mean log of weekly sales (in log) is 8.194 for male managers and 8.094 for their female counterpart, yielding a wage gap of 0.099 which is insignificant, implying that there are no gender disparities in performance.

The mean log of weekly sales (in log) recorded for registered farm is 8.546 and 75698 for non-registered farms, yielding a significant wage gap of 0.976. This outcome implies that there is a significant difference in performance between registered farms and non-registered ones and almost half of this gap is resulting from the unobserved or unexplained component. Put differently, the “coefficient” quantifies the change in the weekly sales (performance) of non-registered farms when applying the coefficients of registered farms to the non-registered farm’s characteristics. This suggests that there exist discrimination between registered and non-registered farms as described in labour economics. Put differently, non-registered farms are discriminated against.

Similarly, there exist a significant difference in performance between members of the Dormaa Poultry Farmers’ Association (DPFA) and non-members. Association members have mean weekly sales (in log) of 8.561 while non-members record 7.573. This yields a significant gap of 0.9886. In a like manner as the registration status of farms, the difference in performance for the said group is flowing from the unexplained component indicating the presence of discrimination among the two groups.



## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents a summary and conclusion on the thesis, recommend policies for stakeholders, provide suggestions for future research and outlines some challenges and hindrances encountered which could aid further research in such area.

#### 5.2 Summary and Conclusions

This study adopted the Cobb-Douglas production function and modeled it to capture both the business climate conditions and personal characteristics of two hundred and seventy-seven observations (poultry farms) located in the Dormaa municipality. The main objective of the study was to determine the factors that influence the performance of poultry farms located in the Dormaa municipality and also investigate whether or not there exist disparities in performance as a result of gender difference, formalization and association membership status and the factors that account for such disparities in performance if indeed they exist.

The relevant theoretical literature reviewed showed different indicators used as proxy for performance as well as factors that determined or influenced the performance of SMEs and poultry farms in other geographical areas. The review showed that among the most frequently used measures of performance were the size of business (number of employees), profitability, Gross revenue, and Income (Lerner, Brush, and Hisrich, 1997). However, Fiorito and LaForge (1986), reported that business owners are generally reluctant to provide financial data on their enterprises. Most often private firms are unwilling to release sensitive data such as their net income or return on investment. Stanger (2000) used sales to measure performance and termed it as the most

commonly reported performance indicator and one that is well defined and understood by all respondents. These reasons, therefore, informed the choice of sales as a proxy for performance.

Furthermore, the outcome of the literature review revealed several determinants of performance. Most of the empirical studies established factors such as educational levels of the manager, gender of manager, years of experience, size of farm, cost of feed, access to finance or credit, extension contact among others to influence performance.

The outcome from the Pooled OLS (the Breusch and Pagan test supported the use of this model) and Between Effect (chosen by the author based on the behaviour of the data exhibiting variations between farms) showed that Association membership, Formalization, Size of farm and the Level of Education significantly determined performance.

The result showed that Association members experience a 37.4% higher weekly sales than non-members confirming the social network theory. The reason being that business associations or memberships provide certain benefits in the form of moral support and advisory services, access to information, deterrence to competition, and sometimes members collude in setting prices or policies to their advantage. These benefits could be the reason behind the differential in performance between members and non-members.

Again, formally registered farms experience a 32.3% higher weekly sales than non-registered farms supporting Rand and Torm (2010) assertion that formalization leads to an increase in the firms' profit, investment and access to credit. Being formalized comes with its own benefits that may translate into sales performance. Formalization boosts firm's status, give them more recognition, improve contract conditions of employees and also places firms in a better position to benefit from government interventions which could translate into their performance.

Also, additional employee (size of farm) generates approximately 12% increment in weekly sales, however, diminishing returns sets in beyond a certain point. This was consistent with the findings of Thibault (2002) among Canadian SMEs. Each additional worker hired brings along some type of resource or talent (experience from previous work, efficiency in delivering of tasks, providing contact to potential customers etc.) which if properly utilized may add value to the business. But, the size square which shows the curvilinear nature of the increase in weekly sales resulting from expansion shows that beyond a certain point weekly sales begins to drop by 0.1%.

Lastly and conversely to our expectation and the theory of human capital, managers with a higher level of education made a 31.1% less of weekly sales as compared to those with lower level of education. Inexperience was attributed to this outcome since majority of the managers (36%) had barely attained 5 years in the working field although majority of them were highly educated (56%). Quinones et al. (1995) and Sweetland (1996) explained that the positive effect of human capital investments (higher levels of education) on individuals' career earnings and the earnings of firms as a whole may be more observable in the long run when they have attained some form of experience in their working field.

The outcome from the Between Effect model was similar to that of the Pooled model in terms of direction but differed in magnitude. For instance, association members experience a 49.6% higher sales than non-members. Also, an additional employee increases weekly sales for an individual farm by 11.1% on an average and just as was encountered for the pooled model, there is a point where diminishing returns set in. Furthermore, managers with advanced level of education recorded 31.8% less weekly sales as compared to those with lower level of education. 39% of the variations existing between farms are explained by this model whereas the overall variation was 34%.

To accomplish the second and third objectives of this thesis, the Blinder-Oaxaca decomposition was used to establish whether or not there existed difference in performance between male and female managers, registered and non-registered farms, and association members and non-members as well as the source of these difference if established to be true, i.e. whether the difference results from discrimination or not. The result did not provide any support for gender disparities in performance. However, there was a significant difference in performance between registered and non-registered farms (0.976) as well as association members and non-members (0.9886). These gaps in performance (almost half and more than half for formalization and association statuses respectively) resulted from the unobserved or unexplained component which labour economists mostly refer to as discrimination. The result further confirmed the pooled OLS estimators of these binary variables.

### **5.3 Recommendations**

In terms of Policy Recommendations, the evidence from this study suggests that affiliation or becoming an association member is a key factor in providing a boost in the performance of farms. It will, therefore, be necessary for policymakers and stakeholders to encourage firms especially SMEs to affiliate or join membership organizations to enjoy the benefits and advantages resulting from such affiliations. Similarly, policymakers and stakeholders should adopt measures to promote and encourage the registration of firms since formalization boosts firm's status, give them more recognition, improve contract conditions of employees and also positions firms to benefit from government interventions which in the long run influence their performance. Formalization of businesses gives them a competitive edge over their opponents and boost governments' revenues through the administration of taxes. Again, Education is key however, it should be blended with experience. The Ministry of Education, Educational institutions and businesses can institute

compulsory internship packages for students while in school for them to acquire on-the-job training to ease school-to-work transition after completion. This practice will make students who are also potential employees abreast with work ethics, provide them with deeper insight and understanding of the theories they learn, establish acquaintances with potential employers among others.

For future research, as with most works, there are always areas in which further research can be conducted. Future works can broaden the scope to look at a more general picture of the poultry industry in the country. This will allow for a more detailed statistical analysis. Also other variables such as levels of production, the source of capital, access to finance, means of land acquisition etc. could be added to make a very interesting analysis. A final recommendation for future research is to use qualitative approach through in-depth interviews to tease out some of the reasons underlying the earlier established outcomes and also to probe more deeply into specific characteristics of successful businesses and their managers and the factors that drive their performance.

#### **5.4 Limitations of the study**

Data acquisition posed the greatest challenge to this thesis. Other variables of interest which could have aided in an in-depth analysis were unavailable. Variables such as the source of capital of poultry farmers, mode of land acquisition, access to finance among others were unavailable therefore restricting this thesis to make a broader and comprehensive analysis.

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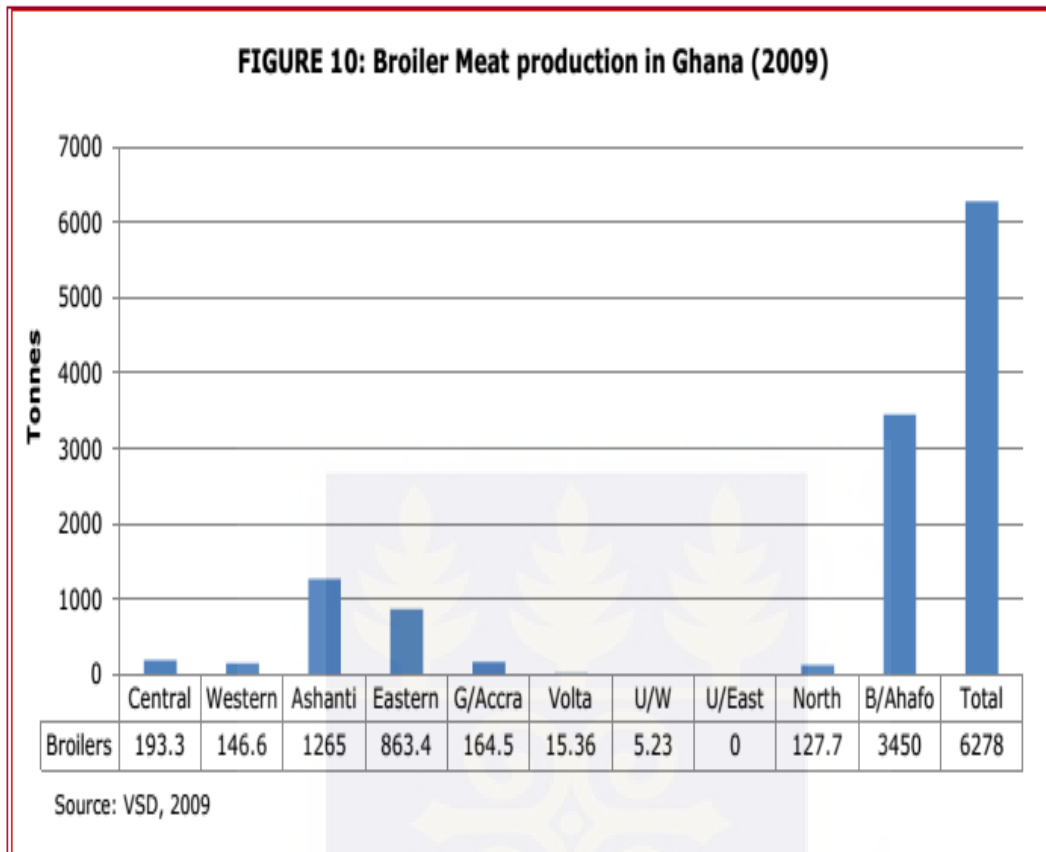
## APPENDICES

APPENDIX 1: Numbers of the poultry species and their regional distribution (2009)

TABLE 2: Numbers of the poultry species and their regional distribution (2009)												
Category	Central	Western	Ashanti	Eastern	G/Accra	Volta	U/W	U/East	North	B/Ahafo	Total	%
Layers	623 499	599 911	7 885 958	2 227 817	2 345 349	465 119	162 162	0	233 866	6 855 037	21 398 718	59.00%
Broilers	161 063	122 203	1 054 066	719 489	137 046	12 801	43 610	0	106 429	2 874 971	5 231 678	14.42%
Cockerels	55 504	179 927	486 594	244 495	31 968	101 823	48 383	0	11 002	302 863	1 462 259	4.03%
<b>Sub-Total</b>	<b>840 066</b>	<b>901 741</b>	<b>9 426 618</b>	<b>3 191 801</b>	<b>2 514 363</b>	<b>579 743</b>	<b>254 155</b>	<b>0</b>	<b>351 297</b>	<b>10 032 871</b>	<b>28 092 655</b>	<b>77.45%</b>
Local chickens	55 731	462 965	647 834	650 740	20 786	363 648	243 735	578 647	1 744 799	279 280	5 048 165	13.92%
Guinea fowls	2 468	12 045	36 103	11 881	5 447	56 076	59 360	622 616	1 414 649	354 351	2 574 996	7.10%
<b>Sub-total</b>	<b>58 199</b>	<b>475 010</b>	<b>683 937</b>	<b>662 621</b>	<b>26 233</b>	<b>419 724</b>	<b>303 095</b>	<b>1 201 263</b>	<b>3 159 448</b>	<b>633 631</b>	<b>7 623 161</b>	<b>21.02%</b>
Ducks	4 361	21 258	45 542	23 170	2 410	47 410	11 879	93 324	56 046	24 645	330 045	0.91%
Turkeys	972	7 608	17 952	9 302	2 362	19 376	3 552	14 352	7 426	47 790	130 692	0.36%
Others	104	1 007	6 705	20	216	5 342	6 793	16 890	49 947	4 936	91 960	0.25%
Ostriches	0	0	6	0	1 635	27	0	6	985	24	2 683	0.01%
<b>Sub-Total</b>	<b>5 437</b>	<b>29 873</b>	<b>70 205</b>	<b>32 492</b>	<b>6 623</b>	<b>72 155</b>	<b>22 224</b>	<b>124 572</b>	<b>114 404</b>	<b>77 395</b>	<b>555 380</b>	<b>1.53%</b>
<b>Grand Total</b>	<b>903 702</b>	<b>1 406 624</b>	<b>10 180 760</b>	<b>3 886 914</b>	<b>2 547 219</b>	<b>1 071 622</b>	<b>579 474</b>	<b>1 325 835</b>	<b>3 625 149</b>	<b>10 743 897</b>	<b>36 271 196</b>	<b>100.00</b>
<b>%</b>	<b>2.49%</b>	<b>3.88%</b>	<b>28.07%</b>	<b>10.72%</b>	<b>7.02%</b>	<b>2.95%</b>	<b>1.60%</b>	<b>3.66%</b>	<b>9.99%</b>	<b>29.62%</b>	<b>100.00%</b>	

Source: Veterinary Services Directorate, 2010

APPENDIX 2: Broiler Meat Production in Ghana (2009)



APPENDIX 3: Descriptive Statistics

Variable	Column1	Mean	Std. Dev.	Min	Max	Observations
<b>Id</b>	overall	86.44765	51.94536	1	184	N = 277
	between		53.26037	1	184	n = 184
	within		0	86.44765	86.44765	T-bar = 1.50543
<b>Time</b>	overall	0.436823	0.4968903	0	1	N = 277
	between		0.3394434	0	1	n = 184
	within		0.410461	-0.06318	0.936823	T-bar = 1.50543
<b>Weekly Sales</b>	overall	8.168913	1.486608	1.791759	13.79531	N = 277
	between		1.213438	4.248495	11.47454	n = 184
	within		0.8283844	4.946053	11.39177	T-bar = 1.50543
<b>DPFA</b>	overall	0.602888	0.4901852	0	1	N = 277
	between		0.4471007	0	1	n = 184
	within		0.2481818	0.102888	1.102888	T-bar = 1.50543
<b>Age of Farms</b>	overall	8.144404	6.309707	1	34	N = 277
	between		6.112975	1	33.5	n = 184
	within		0.4082483	7.644404	8.644404	T-bar = 1.50543
<b>Farm Size</b>	overall	7.299639	12.91193	0	80	N = 277
	between		11.3078	1	74.5	n = 184
	within		2.903958	-12.7004	27.29964	T-bar = 1.50543
<b>Formalization</b>	overall	0.613718	0.4877777	0	1	N = 277
	between		0.4379993	0	1	n = 184
	within		0.2658048	0.113718	1.113718	T-bar = 1.50543
<b>Speciality</b>	overall	0.389892	0.6753735	0	2	N = 277
	between		0.7419281	0	2	n = 184
	within		0.147442	-0.11011	0.889892	T-bar = 1.50543
<b>Level of Educ.</b>	overall	3.638989	0.8552881	1	5	N = 277
	between		0.8553937	1	5	n = 184
	within		0.1276885	2.638989	4.638989	T-bar = 1.50543
<b>Experience</b>	overall	9.787004	6.740112	0	34	N = 277
	between		6.564102	0.5	33.5	n = 184
	within		0.9048981	2.287004	17.287	T-bar = 1.50543
<b>Gender</b>	overall	0.750903	0.4332732	0	1	N = 277
	between		0.4372528	0	1	n = 184
	within		0.0425628	0.250903	1.250903	T-bar = 1.50543

APPENDIX 4: **Blinder-Oaxaca decomposition**

Blinder-Oaxaca decomposition Number of obs = 277

1: gend = 1  
2: gend = 0

lwsale	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>Differential</b>						
Prediction_1	8.193646	.1074027	76.29	0.000	7.983141	8.404152
Prediction_2	8.094353	.1699356	47.63	0.000	7.761286	8.427421
Difference	.099293	.2010309	0.49	0.621	-.2947204	.4933064
<b>Decomposition</b>						
Endowments	.127127	.2276161	0.56	0.576	-.3189924	.5732464
Coefficients	.013815	.1748083	0.08	0.937	-.328803	.3564331
Interaction	-.041649	.2038365	-0.20	0.838	-.4411612	.3578631

Blinder-Oaxaca decomposition Number of obs = 277

1: formal = 1  
2: formal = 0

lwsale	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>Differential</b>						
Prediction_1	8.545991	.1226525	69.68	0.000	8.305596	8.786385
Prediction_2	7.569817	.1105773	68.46	0.000	7.353089	7.786544
Difference	.976174	.1651393	5.91	0.000	.652507	1.299841
<b>Decomposition</b>						
Endowments	8.067891	7.196252	1.12	0.262	-6.036503	22.17229
Coefficients	.4133201	.1750642	2.36	0.018	.0702006	.7564395
Interaction	-7.505037	7.184282	-1.04	0.296	-21.58597	6.575896

Blinder-Oaxaca decomposition Number of obs = 277

1: dpfa = 1  
2: dpfa = 0

lwsale	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>Differential</b>						
Prediction_1	8.561484	.1210094	70.75	0.000	8.32431	8.798658
Prediction_2	7.572917	.1169532	64.75	0.000	7.343693	7.802142
Difference	.9885669	.1682894	5.87	0.000	.6587257	1.318408
<b>Decomposition</b>						
Endowments	-2.490675	2.242453	-1.11	0.267	-6.885802	1.904453
Coefficients	.510307	.1765639	2.89	0.004	.1642482	.8563658
Interaction	2.968934	2.259098	1.31	0.189	-1.458816	7.396685