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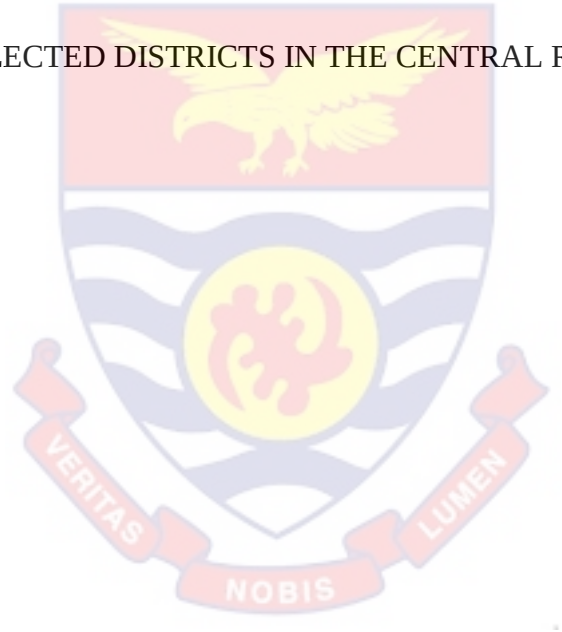

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POULTRY HUSBANDRY COMPETENCIES OF FARMERS AND CHALLENGES FACED BY AGRICULTURAL EXTENSION AGENTS IN SELECTED DISTRICTS IN THE CENTRAL REGION, GHANA

BY

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A thesis submitted to the Department of Agricultural Economics and Extension of the School of Agriculture, College of Agriculture and Natural Science, University of Cape Coast, in partial fulfillment of the requirements for the award of Master of Philosophy Degree in Agricultural Extension

SEPTEMBER, 2024

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature……Data……

Name: Emmanuel Abdoni

Supervisor's Declaration

1 hereby declare that the preparation and presentation of this thesis were supervised in accordance with the guidelines on the supervision of the thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature …… Date……

Name: Prof. Festus Annor-Frempong

ABSTRACT

Many poultry farmers lack the skills and knowledge needed to effectively scale up their production, which limits their ability to meet growing demand and improve productivity. Essential competencies such as proper feeding, disease prevention, housing management, breeding techniques, and biosecurity measures are often missing, leading to challenges like disease outbreaks, poor waste management, and low profitability. These gaps stem from a lack of sufficient poultry husbandry competencies. The study examined farmers' poultry husbandry management competencies and the challenges of agricultural extension agents in selected districts in the Central region of Ghana. The study used a descriptive survey design and a census procedure to select respondents. A questionnaire was used to collect data from 130 farmers and 10 extension agents. Kerndall's concordance of coefficient, stepwise regression, correlation coefficients, and descriptive statistics were used to analyze the data. The findings revealed that the farmers have a deeper understanding of determining appropriate sources of healthy birds, maintaining sanitation, identifying various poultry diseases, and selecting appropriate structure types for birds. However, significant gaps in knowledge were found in the periods of vaccination and disinfestation. Finally, agricultural extension agents faced significant challenges such as disease management. The study recommends a collaboration between universities and the Ministry of Food and Agriculture to develop comprehensive training modules and effective methods for poultry husbandry management, aimed at training both extension agents and farmers. Further, MoFA should focus and improve on disease surveillance

KEYWORDS

Poultry farmers, Poultry husbandry, Competencies, Extension agent, Constraints and challenges to poultry husbandry management.

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Also, I would like to express my profound gratitude to the Ministry of Food and Agriculture, Eastern Region, specifically Awutu Senya West, Gomoa East, and Agona East District for their support during my fieldwork.

DEDICATION

To my lovely wife (Mrs. Charlotte Boakye) and children.

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CHAPTER ONE

INTRODUCTION

Overview

Chapter one of the study presents the general background of the study, the statement of the problem, general and specific objectives, research questions, and justification of the study. Also, presented in Chapter One are the delimitations, limitations, and organisation of the study.

Background of the Study

The agricultural sector is essential in contributing to developing many developing countries as it is notated to provide food, employment, shelter, income, and other necessities of life for farm households (Umar & Phoa, 2012). The World Bank report in 2018 showed that the agricultural sector exuberates efforts to reduce poverty, raise the income levels of smallholder farmers, and advance global food security. The report further indicated that the World Bank therefore committed USD 6.8 billion to agriculture, to improve the livelihoods and economic welfare of rural communities in developing countries (World Bank, 2018). Essegbey et al. (2015) noted that the different sub-sectors under the agricultural sector are often spearheaded by the Ministry of Food and Agriculture to collectively provide employment, food, shelter, and income for households. These sectors include crop production, forestry, fisheries and aquatic, and livestock.

Poultry husbandry falls under the livestock subsector and deals with the raising of fowl (Daghir, 2008). Adei and Asante (2012) revealed that the management of poultry production husbandry is geared towards producing meat, eggs, and other by-products that are of economic value to the public. The poultry sector

includes chicken, turkey, ducks, and geese (Yugo, Hauck, Shivaprasad & Meng, 2016). The meat and eggs of poultry are the main sources of animal protein consumed by most people globally from the wide diversity of cultures, traditions, and religions. Poultry serves as the priority sector in contributing to employment, food security, income generation, and the protein needs of the people.

In Ghana, the Central Region contributes the least to the poultry sector despite having the necessary resources and being centrally located in poultry consumption hubs. The Ashanti Region accounts for almost 40 percent of Ghana's poultry population, with an average of 550,000 birds; the Brong Ahafo Region, which is presently divided into the Bono, Bono East, and Ahafo Regions, accounts for 20-25 percent, with an average of 350,000 birds. The Greater Accra Region contributes 10-15 percent, with an average of 235,000 birds. The Eastern Region provides around 10 percent of the total, with an average bird count of 210,000. The Central Region contributes 5-7 percent of the whole national production, with an average of 150,000 birds (GSS, 2021; MoFA, 2019).

Poultry husbandry management programmes are essential for improving the productivity of poultry farming, particularly in Awutu Senya West, Gomoa East, and Agona East in the Central Region of Ghana. These three districts, for example, contributed about 103,478 poultry birds and 80,893 poultry eggs in 2018 (MoFA, 2019). The production levels fell far short of expectations due to the low productivity of birds. The Government of Ghana assisted over 500 poultry farmers through the Ministry of Food and Agriculture (MoFA). This was to create a more competitive and efficient livestock business that enhances

domestic production, reduces livestock product importation, and creates jobs (MoFA, 2021). The farmers received 5,000 cockerels at reduced prices for breeding. These measures aimed to strengthen the livestock value chain, reduce dependency on imported poultry products, and create jobs, thereby contributing to broader economic development goals (MoFA, 2021).

Agricultural extension agents play a pivotal role in the success of such initiatives and poultry husbandry management. These agents serve as a critical link between farmers and the necessary resources, knowledge, and skills required for effective poultry management (Ametepey, 2020). Through training, demonstrations, and regular interactions, extension agents disseminate vital information on best practices in poultry nutrition, housing, breeding, disease prevention, and waste management (Mountney, 2017). Through imparting this knowledge and fostering the development of practical skills, extension agents empower farmers to adopt innovative husbandry management practices, which will ultimately enhance productivity. Poultry husbandry management aligns closely with these efforts aimed at enhancing farmers' capacities to overcome the challenges they face. Resolving inadequate management practices will contribute to creating a healthy husbandry management practice among farmers.

Statement of the Problem

The competencies of agricultural extension agents (AEAs) in the form of knowledge, skills, and abilities are critical for ensuring that farmers adopt best practices in poultry management. AEAs play a pivotal role in transferring knowledge and skills to farmers, particularly in rural areas, as they work under the Department of Agriculture within the Ministry of Food and Agriculture (MoFA). Spencer and Spencer (2008) highlighted the importance of delivering

competencies efficiently to ensure tasks are carried out safely and cost-effectively. However, the ability of farmers to apply these competencies at the farm level often depends on their socio-demographic characteristics, such as education level, farming experience, and age (Koontz & Newig, 2014; Muchangi, 2016).

Research has shown that extension agents significantly influence the adoption of agricultural technologies. Ametepey (2020) found that moderate competencies among extension agents played a significant role in influencing farmers' adoption of commercial pineapple production technologies. Similarly, Adisa (2015) concluded that AEAs with high competencies in livestock production successfully worked with farmers to improve livestock farming practices. In the Northern Region of Ghana, Issahaku (2014) found that AEAs exhibited strong interpersonal relations, communication skills, personal qualities, and technical knowledge, which were critical for supporting farmers effectively.

Despite these findings, there is limited research on the competencies of poultry farmers in the Central Region of Ghana. MoFA (2021) reported that low poultry production and the adoption of appropriate technologies could be attributed to farmers' limited knowledge and skills in poultry husbandry management. While the government of Ghana has implemented programs such as Rearing for Food and Jobs (RFJ) to improve poultry production, the sector continues to face challenges, including disease outbreaks, inadequate feeding systems, poor housing facilities, and reliance on subpar medication (Okeoghen, 2013). These challenges are further compounded by farmers' lack of

competencies in disease prevention, feeding optimization, and housing improvement.

Farmers in districts such as Awutu Senya West, Gomoa East, and Agona East benefit from their proximity to Accra and Tema, where resources like feed, medicine, and markets are more accessible. Conversely, farmers in regions like Kumasi, Bono East, Bono, and Ahafo face greater difficulty accessing these essential resources, which exacerbates their challenges in managing poultry farms effectively. The lack of competencies among farmers in these areas limits their ability to achieve optimal production levels (Alders et al., 2018).

Literature on the adoption of agricultural innovations indicates that farmers with higher education, larger farm sizes, access to credit, and frequent extension services are more likely to acquire the necessary competencies for improving productivity (Rogers, 2003; Meijer et al., 2015). However, there is a significant gap in understanding poultry husbandry management competencies among farmers in the Central Region, as well as the challenges faced by extension agents in delivering these competencies.

Given the socioeconomic benefits that could result from improved poultry production, it is imperative to undertake research to determine the competencies of farmers in poultry husbandry management and identify the challenges hindering effective training and knowledge transfer. This study aims to address the knowledge gap and provide insights to enhance poultry production in the Central Region. The key question, therefore, is whether farmers have the necessary competencies to effectively apply the knowledge and skills gained from Agricultural Extension Agents (AEAs) to improve their farms.

1. What are the background (social, demographic, and economic) characteristics of poultry farmers and extension agents?
2. What is the state of poultry husbandry in the study?
3. What are the perceived competencies of poultry farmers in poultry husbandry?
4. What are the factors influencing the acquisition of perceived competency in poultry husbandry by the farmers?
5. What are the perceived challenges in the poultry industry in the study area from the perspective of farmers?
6. What are the challenges faced by the AEAs when executing their responsibilities in enhancing the acquisition of poultry husbandry management by farmers?

General Objective

The general objective was to assess the competencies of agricultural extension agents and farmers in poultry husbandry in Awutu Senya West, Gomoa East, and Agona East of the Central Region.

The specific objectives are to;

1. Describe the background (social, demographic, and economic) characteristics of poultry farmers and extension agents.
2. Describe the state of poultry husbandry in the study.
3. Examine the challenges in the poultry industry in the study area from the perspective of farmers and extension agents.
4. Determine the perceived competencies of poultry farmers in poultry husbandry management.

5. Determine the factors influencing the perceived competency in poultry husbandry management of the poultry farmers.
6. Examine the challenges faced by the AEAs in enhancing the acquisition of poultry husbandry by farmers.

Significance of the Study

The study assessed poultry husbandry competencies of farmers and extension agents in Awutu Senya West, Gomoa East, and Agona East of the Central Region of Ghana. The selected districts include Awtu Senya West, Gomoa East, and Agona East. The Ministry of Food and Agriculture can use the results to fashion out policies to improve poultry production in the Awtu Senya West, Gomoa East, and Agona East districts of the Central Region.

In addition, the study can help uncover gaps in the competencies of extension agents who are responsible for disseminating information and providing technical assistance to poultry farmers. This data can be used to customize capacity-building activities and training programmes to increase the effectiveness of extension services in the region.

Finally, farmers must implement measures that reduce environmental impact, increase animal health, and ensure economic viability to produce poultry sustainably. Understanding farmers' and extension agents' competencies can help them embrace sustainable agricultural methods that contribute to long-term environmental and economic viability.

Limitations

The unavailability to participate in the study by some of the farmers because they were trying to fold up their businesses. As a result, it was difficult to confirm certain facts provided by all the farmers. The contact numbers of

these farmers were collected, and follow-up calls were made to cross-reference and verify the information they had previously provided.

Again, poultry farmers felt neglected, and the cost of production was taking them out of business. Therefore, some were unwilling to participate in the study and had to be convinced about its importance. Finally, the outbreak of the global coronavirus pandemic, which has impacted social distancing among others, also prolonged the period of the data collection exercise. Thus, most farmers were reluctant to participate in the study because they were afraid to contract the disease. Thus, additional resources outside the study's budget were needed to acquire personal protective equipment for the farmers to allow them to participate in the study.

Delimitations

The study was delimited to poultry farmers, specifically those engaged in raising chickens. This focus ensures that the research is tailored to address the unique challenges and practices related to chicken farming. Again, the poultry farmers who were the focus of the study were those registered with the Department of Agriculture. Some farmers operate independently, without any formal connection to the public extension staff of the Department of Agriculture. The perceived poultry husbandry competencies of farmers and AEAs were the focus of this study.

Definition of Key Terms

Poultry: These are domesticated birds kept by humans for their eggs and meat. Specifically, poultry in the study means dual-purpose breeds (eggs and meat).

Poultry Husbandry: Poultry Husbandry are procedures, activities, and strategies that are put in place to give care and maintain the health of domesticated birds to ensure their well-being and productivity in producing meat and eggs. These included selecting the type of birds, determining appropriate sources of healthy birds, selection of structure type for birds, breeding and genetics, health maintenance, biosecurity, handling of day-old chicks, egg production, meat production, provision of lighting for birds, formulation of poultry feed, housing, operating commercial poultry pen, identification of the various poultry diseases, waste disposal, litter changing, vaccination, sanitation, transportation of chicks, disinfestation, and practices before stocking your day-old chicks

Perceived Competencies: These are the knowledge, skills, and abilities of poultry husbandry management farmers possess

Extension Agents: Staff of the Departments of Agriculture mandated to spearhead the transfer of competencies in poultry husbandry management.

Small-scale farmers: Poultry farmers who own and manage less than 2,000 dual-purpose breeds.

Organization of the Study

Chapter One considered the general introduction to the study which encompasses the background to the study, statement of the problem, main objectives of the study, specific objectives, research question, and significance of the study. Delimitation, limitation as well as definition of keywords and organization of the study are also included. Chapter Two consists of a review of related literature, theoretical framework, concepts, and empirical review.

Chapter Three continued with the research methods and procedures used for the study. Items included are the research design, sampling procedures, population, data collection instrument, and methods for data collection and analysis. Chapter Four presents and discusses the findings of the study. Chapter Five comprised the summary, conclusions, and recommendations based on the results of the study. Further areas of study are included in this chapter.

CHAPTER TWO

LITERATURE REVIEW

Chapter Two presents the theoretical framework, concepts, and empirical review of existing information concerning the study. The conceptual framework adapted to study the poultry husbandry competencies of farmers is included.

Theoretical Framework

Theories are systematic frameworks or explanations designed to comprehend and explain facts, events, or observations. Furthermore, theories consist of concepts, principles, or laws that aid the organization and interpretation of data and form the foundation for further research and knowledge generation (Hatch, 2018). The study focuses on poultry husbandry management competencies of farmers therefore the Durand competency theory and the Borich competency needs assessment model were used to underpin the research.

Durand competency theory propounded by Thomas Durand in 1988 states that, competencies is a combination of skills, knowledge, and attitude (Duran 1988). The theory views competence as how knowledge (what we know), attitude (how we think about what we know), and skills (know-how) interact. The assumption is that competency is a product of the combination of knowledge, attitude, and skills. Durand (1988) went on to explain that the "knowledge" dimension is the accumulation of information over the course of a person's lifetime that is assimilated and structured by them in order to comprehend the "world." Knowledge is acquired through various learning activities, including formal training, utilizing existing knowledge, and learning

by doing. Similarly, Durand (1988) defines skills as proficiencies gained through instructional companionship, existing expertise, and practical experience, enabling individuals to perform executive activities within a specific role. Skill is also the capacity to apply and use the learned information in an action to accomplish a particular goal. Thus, skill enables one to select techniques and information and combine them with experience to solve a problem. Attitude is associated with social companionship, self-identity, and learning by sharing. Durand (1988) described attitude as the extent to which a person, goal, occasion, or object is accepted or rejected. The underlying beliefs, values, and dispositions that individuals hold, influence their behaviours, actions, and interactions in the workplace. Attitude is considered a key component of competency alongside skills, knowledge, and abilities, as it plays a significant role in determining an individual's effectiveness and performance within a particular job. In conclusion, attitude, skills, and knowledge are interrelated and complementary. A well-rounded individual with a positive attitude, relevant skills, and up-to-date knowledge is better equipped to meet the challenges of their role, contribute effectively to the organization, and achieve success in their career.

Amepetey (2020) when assessing the competencies of AEAs and smallholder farmers for the adoption of commercial pineapple production technologies, adopted the Durand theory to explain that AEAs and farmers required adequate competency level to scale up pineapple production.

In applying the theory in the current study, knowledge of best management practices in poultry husbandry is essential for optimizing productivity and welfare. This includes understanding proper housing systems,

environmental controls, biosecurity measures, and waste management practices. AEAs can educate farmers on these practices, and farmers need to apply this knowledge to ensure the health and well-being of their poultry. The skills in poultry husbandry management include practical abilities, in setting up and maintaining appropriate housing, administering vaccinations, disease diagnosis, and ensuring proper feeding practices. Extension agents and farmers acquire skills through hands-on experiences, learning by doing, and utilizing existing skills in managing day-to-day operations on the poultry farm (Suvedi & Kaplowitz, 2016). Also, attitude in poultry husbandry includes the mindset and approach of individuals toward responsibilities. This could involve a positive approach to problem-solving, a commitment to animal welfare, and a willingness to adopt new, improved practices. Attitude is shaped through social interactions, self-identity, and learning by sharing experiences with others in the field (Hogg & Smith, 2007).

Effective poultry management requires a balanced integration of these three dimensions. Possessing theoretical knowledge about poultry husbandry is not sufficient. Competence is enhanced when individuals can apply this knowledge practically on the farm. For instance, understanding the nutritional requirements of poultry (knowledge) must be complemented by the ability to formulate and provide appropriate feed (skill). Furthermore, practical skills alone may lead to suboptimal outcomes. Understanding the underlying principles and scientific knowledge supports the effective application of skills. For example, administering vaccinations (skill) is more effective when based on knowledge of disease cycles, immunity, and vaccine efficacy. Finally, a positive attitude is crucial in poultry husbandry. It involves a commitment to

ethical practices, animal welfare, and continuous improvement. Without the right attitude, even well-founded knowledge and skills might not lead to sustainable and ethical poultry management. In conclusion, the Thomas Durand competency theory provides a framework to understand that successful poultry husbandry management involves a holistic integration of farmers' knowledge, skills, and attitudes.

Borich Competency Needs Assessment

The Borich Competency Needs Assessment is a widely used framework for determining the training and development requirements of professionals. The Borich Model, created by Gary Borich in 1979, is a systematic tool used to evaluate the disparity between an individual's existing competence levels and the competencies required for successful job performance (Borich, 1979).

The Borich Competency Requirements Assessment employs a dual-rating system in which participants assess the significance of certain competencies and their level of expertise in those competencies. This dual method enables a comprehensive examination of the areas where training is most required (Borich, 1979) .

The essential component of the Borich model is the Mean Weighted Discrepancy Score (MWDS), which is determined by assigning a weight to the difference between the importance and proficiency ratings. Greater values of MWDS suggest a higher level of training requirements (Garcia, 2023).

The first step is to identify the specific competencies required for a particular role or task. These competencies can include knowledge, skills, and attitudes that are essential for effective job performance. Participants (e.g., teachers, extension agents, or farmers) assess their current level of competency

for each identified area. This self-assessment usually involves rating their abilities on a scale (e.g., 1 to 5). Participants also rate the importance of each competency for their job performance. This step helps to identify which competencies are most critical to their role. The model calculates the discrepancy between the self-assessed competency level and the importance rating. This discrepancy, or gap, indicates areas where the individual may need further development or training. The competencies with the largest discrepancies between current ability and importance are prioritized as the most urgent areas for professional development. This allows organizations or educators to focus resources on the areas that will have the greatest impact. Based on the prioritized competency needs, targeted training or professional development programs are designed to address the gaps identified through the assessment (Shernoff et al. 2017).

The competency needs assessment takes into account the significance of competence and the individual's self-assessed proficiency to guarantee that the highlighted training requirements are both crucial for work performance and recognized as areas for growth by the person.

The Borich Competency Needs Assessment Model has been used in many fields, such as education, agriculture, healthcare, and business. This tool assists businesses and educators in determining the most important areas for training, allowing them to deploy resources effectively and focus on improving performance. The Borich Competency Needs Assessment Model is a valuable tool for enhancing professional development through targeted training. By identifying the specific competencies that need improvement, organizations can

design effective training programs that enhance overall job performance and efficiency. (Ashraf et al. 2020)

Elhamonly et al. (2014) used the Borich model to assess the training needs of agricultural extension workers regarding environmental and sustainable farming practices. They revealed gaps between the current competency levels of the agricultural extension workers and the required competencies for effective performance in environmental and sustainable farming practices. The MWDS indicated that workers perceived the importance of these competencies but rated their proficiency as low, highlighting a critical need for training. Moreover, Franz et al. (2010) determine the requirements for agricultural extension agents' training. The findings revealed significant gaps in the competencies of agrarian extension agents concerning sustainable agricultural practices. The AEAs reported high importance for various sustainable practices but rated their current competency levels lower, indicating a clear need for targeted training.

Using the Borich Competency Needs Assessment Model for poultry husbandry management provides a systematic method to identify and prioritize training needs based on the discrepancy between current competencies and the importance of those competencies. This approach ensures that training programs are effectively targeted to address the most significant gaps, leading to improved poultry management practices among farmers. The subsequent subtitles review the concept of competency, knowledge, skills, agricultural extension, poultry husbandry management, and challenges in poultry husbandry management.

Concept of Competency

Competency refers to the combination of skills, knowledge, abilities, and behaviors that individuals are expected to demonstrate to excel in their assigned roles. It is the ability to perform one's job effectively by applying knowledge, attitude, and skills (Davis, 2005). Similarly, competency is a dynamic blend of aptitude, skills, and knowledge that are arranged and coordinated to enable a person to complete a task effectively (Movahedi & Nagel, 2012). Meanwhile, Garavan and McGuire (2001) added that the abilities, capacities, and potentials of a person, a group, a team, or a work unit called competency are essential for the achievement of goals and organisation. Movahedi and Nagel (2012) proposed four topics that experts in any discipline should focus on. They are as follows: technical (profession-specific abilities and motor skills), methodological (capacity to learn and absorb basic workplace and learning skills), social (capacity to collaborate and communicate), and, lastly, personal (self-awareness and accountability) development of interests and life plan.

Review of Concept

The review of competency theory has brought forth the need to review the concepts of knowledge, attitude, and skills. Knowledge, according to Rumelhart and Ortony (2017), is a concrete manifestation of intelligence that results from the interaction between a person's potential to acquire new ideas and situations (opportunity to learn) and hence is more socially created than intelligence. Once again, knowledge includes theory, concepts, and inferred knowledge gained via experience in carrying out specific assigned tasks. According to Dwivedi et al. (2021), knowledge is a concrete manifestation of

intelligence that results from the interplay between an individual's capacity to learn new concepts and circumstances (opportunity to learn), and as such, is more socially constructed than intelligence. Theory, concepts, and inferred knowledge acquired through experience performing particular assigned tasks are all considered forms of knowledge (Dwivedi et al., 2021). Kopp, Hasenbein, and Mandl (2014) assert that knowledge is necessary to fulfil content-specific tasks and fulfil content-specific requests.

According to Mai, Verplanken, and Haddock (2018), attitude is a person's general assessment, sentiments, or views about people, objects, events, or ideas. It refers to a set of emotions, beliefs, and behavioural inclinations that influence how people perceive and react to various circumstances in their lives. Attitudes can be positive, negative, or neutral, and they influence people's behaviours, decisions, and interactions with others. Thus, personal experiences, socialization, culture, media, and interpersonal interactions can all influence one's attitude. They can also be influenced by variables such as parenting, education, peer pressure, and societal expectations (Mai et al., 2018). Attitudes are not stable and can shift over time in response to new experiences, information, or persuasion. According to Raziq and Maulabakhsh (2015), a positive attitude is seen as a vital ability that leads to personal achievement, organisational effectiveness, and a pleasant work environment.

Foster and Chow (2020) described skill as a combination of muscular performances that are properly adjusted. It was thought to care about both the amount and caliber of motor output. The word "skill" usually refers to an individual's degree of performance in terms of accuracy and speed when carrying out particular tasks assigned to them. A skill is the ability to perform a

specific task or action effectively and proficiently. Skills are developed through training, practice, and experience (Katz, 2009). In that context, skills represent the practical know-how or the ability to apply knowledge in action to achieve specific goals or tasks. Skills, along with knowledge and attitude, contribute to overall competency in a given area.

Agricultural Extension

According to Demiryurek (2014), different professionals interpret extension differently based on their backgrounds. Extension is perceived as a policy tool used to improve national food security, food safety, and export market production. The purpose of the extension is to raise farmers' income by encouraging rural farmers to adopt new technologies that increase production. Meanwhile, according to Hansen (2015), agricultural extension is still a service that helps farmers solve their own identified problems.

Agricultural extension, according to Adam, Zakaria, and Abujaja (2014), is the continuous process of giving farmers or rural residents relevant information and helping them develop the knowledge, abilities, and attitudes needed to use this information or technology to increase productivity and rural development. Conceptually, agricultural extension is a process of education and communication that helps a group of people undergo change. It provides important and helpful information to encourage skill development among rural residents, especially farmers, and to actively involve them in their own development. Agricultural extension is a type of adult education that differs from traditional classroom education in that it trains its clients to face today's concerns and to live in the present. Formal education, on the other hand, prepares students for life once they leave school.

Agricultural Extension is charged with facilitating the transmission of better agricultural technologies to rural farmers to facilitate agricultural development. AEAs ensure that their clients (farmers) have access to enhanced and tested technologies that have significant benefits for increasing yield and output. The Agricultural extension also guarantees that farmer wants and concerns are addressed appropriately by the proper organizations with the correct kind of solution to farmer problems (MoFA, 2013; Wolfert et al., 2017).

Again, in addition to the above-mentioned mandate, agricultural extension guarantees that the developing issues of farmers in the sector are met with the appropriate answers to allow the industry to develop. According to Mireku, Kuusaana, and Kidido (2016), AEAs in Ghana are allocated three primary functions to carry out their mandate. Making regular and methodical visits to rural farms and developing reports with farmers to understand their difficulties are among them. Second, AEAs conduct educational activities such as meetings, campaigns, method demonstrations, field days, and training sessions with exhibitions. Finally, AEAs are charged with advising farmers on how to handle their production concerns.

Poultry production

The poultry industry is wide enough to include all the major domesticated feather species. This includes chicken, guinea fowl, turkey, duck, geese, quail, and ostrich in Ghana. In Ghana, chicken is the most prominent poultry species, with around 96.3 percent of poultry farms producing chicken-related goods, which are divided into two production segments: layer production, with table eggs as the primary output, and broiler production, with live birds as the primary output (Amanor-Boadu, 2016). The largest segment of

Ghana's chicken business is layer production. In 2015, around 74.3% of chicken farms produced eggs, while only 38.8% produced broilers. Layer operations can be found in all ten Ghanaian regions, however, the most concentrated areas are the Greater Accra Region (11.9% of all layer farms), the Ashanti Region (24.6% of all layer farms), the Brong-Ahafo Region (22.5% of all layer farms), and the Eastern Region (12.7% of all layer farms) (Nti, 2018). Most layer production takes place on a large number of small farms. In 2015, 88% of all chicken farms with layers were small-scale layer farms, which had fewer than 5,000 birds, and 5.6% were large-scale layer farms, which featured more than 10,000 birds. Additionally, 6.3% of all poultry farms with layers were farms with fewer than 10,000 but more than 5,000 birds (Nti, 2018).

The two regions with the highest concentration of broiler production are Greater Accra (21.1% of all broiler farms) and Eastern (18.4% of all broiler farms). Similar to layer production, the majority of broiler production occurs on numerous small farms. About 86.7% of broiler farms are small-sized, 8.6% are medium-sized, and the remaining 4.8% are large-sized, according to the 2015 poultry census report. Nonetheless, the Ashanti Region (roughly 7.5% of large broiler farms) and the Brong-Ahafo Region (about 15.6% of large broiler farms) are home to the majority of large-scale broiler operations (Owusu, 2021).

The size distribution of chicken output in Ghana for 2015 is summarized in the 2015 Ghana Poultry Industry survey report. In 2015, small-sized layer farms accounted for 32.0% of total egg output and produced an average of 6,091 crates of eggs per farm, while medium-sized layer farms accounted for 13.2% and produced an average of 33,573 crates of eggs per farm. In 2015, large-scale

layer farms produced an average of 157,567 crates per farm, accounting for 54.8% of total egg output (Nti, 2018).

The average production per farm in the Brong-Ahafo, Ashanti, and Central Regions in 2015 was 27,544 crates, 25,235 crates, and 11,061 crates, respectively, based on the distribution of egg production by region. In the three northernmost regions, Western, and the low-egg-producing areas of Volta, the average egg production per farm was 2,357 crates, 4,855 crates, and 4,342 crates, respectively. Large-scale farmers raised 15,000 chickens, medium-sized farmers raised 2,807, and small-scale broiler farmers raised an average of 530. Simultaneously, medium-sized farmers produced 17.0% of the total broiler output, large-scale farmers produced 50.4%, and small-scale farmers produced 32.6%. Brong-Ahafo, Ashanti, and Greater Accra, the top three broiler production regions, produced an average of 3,792 birds, 1,525 birds, and 1,006 birds per farm in 2015. However, with an average of 549 and 895 birds per farm, respectively, the Western Region and the Volta Region had the smallest broiler flock sizes (Nti, 2018).

Based on farm size and location, chicken farms vary in other economically significant areas (gross margin and production cost), according to data from the 2015 poultry census. Generally speaking, larger chicken farms have higher average gross margins and lower average production costs. According to Nti (2018), the total average variable cost for large-sized broiler farms was roughly GHS 20.10 per bird and GHS 11.32 per crate for large-sized layer farms. Average gross margins for large-sized broiler and layer farms were GHS 10.49 per bird and GHS 1.73 per crate, respectively; GHS 10.34 per bird and GHS 1.73 per crate for medium-sized broiler and layer farms, respectively;

and GHS 8.64 per bird and GHS 1.24 per crate for small-sized broiler and layer farms, respectively (Owusu, 2021).

Cost structures and gross margins also differ significantly by region. While low-egg production areas have higher average gross margins, high-egg production areas have lower average variable costs. Central and Greater Accra have the highest variable costs in chicken egg production, averaging GHS 12.57 and GHS 12.43 per crate of eggs, respectively, while Ashanti and Brong-Ahafo Region have the lowest variable costs, averaging roughly GHS 11.83 and GHS 11.62 per crate of eggs, respectively. With an average gross margin of GHS 1.74 per egg crate, the Volta Region has the highest gross margin. With an average profit margin of about GHS 1.60 per crate of eggs, in the northern and western most districts trailed closely behind. In the Ashanti and Brong-Ahafo regions, the average gross margin per egg crate was GHS 1.14 and GHS 1.33, respectively. Allocative, cost, and technological efficiency in Ghanaian domestic chicken production may vary by region and size, as evidenced by the changes in average cost, average gross margin, and flock size presented in this section (Amanor-Boadu, 2016).

Poultry Husbandry

Poultry husbandry refers to the science and art of breeding, raising, and managing domesticated birds for meat and eggs. Poultry husbandry entails diverse care to ensure the good health, well-being, and optimal production of poultry birds. Effective poultry husbandry management maintains the health, welfare, and productivity of the birds while optimizing operational efficiency and profit (Nkukwana, 2018).

Good poultry husbandry management provides food, light, water, and comfortable housing that has a favorable impact on birds. The broiler house provides conditions and keeps birds secure and healthy secure and healthy, with fresh food and water. When birds are provided with a pleasant habitat, they remain healthy, perform well, and reproduce normally. Unnecessary bird activity imposes pressure on weight increase, bone strength, and food conversion (Lacy, 2002).

The bird's house or cage should be made such that it may freely move around while also providing appropriate ventilation. To assist minimize disease transmission, the floor should be kept clean and free of garbage. Birds confined in cages should have access to a clean, dry environment where they can feed, drink, and sleep. It is also critical to adhere to the broiler's specified adequate space allowances (Nkukwana, 2018).

Supplemental heat is required to maintain the proper temperature in the brooder housing. The most effective method for keeping chicks warm in cold weather. When the temperature is low enough, the chicks will either suffocate each other or die within a few hours. However, if we heat the brooders enough to get them accustomed to the house temperature, they will be able to withstand the cold winter and grow nicely. The temperature inside the brooding area must be kept at a comfortable level for the chicks. The optimal temperature range for broiler chicks of various ages is 27 to 35 degrees Celsius. Furthermore, thermometers should be strategically positioned throughout the chicken house to check the temperature. A maximum and minimum thermometer should be hung in each cage to serve as a reference for controlling the differences in the house temperature. Chick behaviour indicates whether or not they are receiving

the desired quantity of heat. When the temperature drops below the recommended level, the chicks strive to move closer to the source of heat and huddle under the brooder. When the temperature becomes too high, the chicks will flee the source of heat, panting or gasping. When the temperature is right, the chicks will be evenly distributed. Brooders are no longer required in hot weather after the chicks are about 3 weeks old (Patrick 2019).

Chicken growth performance is affected by proper food management. Quality feeding is essential for keeping a profitable broiler. These factors can have a substantial impact on a chicken enterprise's profitability (Daghir, 2008). During the growth cycle, broilers are frequently fed pelleted feed. During the first two weeks, chicks are fed pelleted feed that has been broken down into small enough particles for the birds to consume comfortably. Pellets assist broilers in eating more efficiently and growing quickly. Pellets make it easier for birds to ingest feed and prolong the transit of meals (Lacy, 2002).

Water is an important but frequently overlooked nutrient. Animals can survive for longer lengths of time without food than they can without water. Water is present in every component of an animal's metabolism. It is essential for maintaining body warmth, digesting food, and removing waste. Poultry flocks require enough quality and quantity of water to stay healthy. Agrovet and colleagues (2015) For every kilogram of feed ingested, a broiler will drink around 2 litres of water. This indicates that every kilogram of bird grown requires around 3. 5 liters of water, assuming a lifetime feed conversion of 1. 75. Furthermore when broilers are overheated, they use more water to cool off. "Failure to supply birds with enough water at the right time will harm the feed-

conversion ratio and result in birds not reaching their full genetic potential," according to Palte et al. (2017).

It is recommended that the broiler house be properly cleaned and disinfected twice a year to reduce pollution and disease spread. All leftover feed/waste should be removed and disposed of, as residual animal waste attracts insects and may lead to disease transmission if not properly disposed of. Any leftover feed must also be removed from feed bins, feed pans, and augers. The feed bin inside should be cleaned and disinfected regularly with a 10% chlorine bleach solution (Lacy, 2002).

Birds behave positively when they are well-treated. Birds raised in a calm, serene, and loving environment surpass those raised in a loud, harsh, and careless setting. Excessive stress causes the birds to expend energy, reducing growth and feed conversion. Work should be done as softly and slowly as possible in and around the broiler houses. Unnecessary bird activity wastes energy that may be used to gain weight (Lacy, 2002).

Light is considered to be one of the most significant environmental components for birds. It influences growth rate and regulates numerous physiological and behavioural processes. Light assists the bird in establishing rhythmicity and synchronizing numerous vital functions, such as body temperature and various metabolic steps that improve feeding and digestion. Light management is also frequently utilized to improve factory efficiency. According to Graaf (2019), numerous alternative lighting regimens can be employed for broiler rearing. "Many recommendations for broiler lighting programs are region-specific and not applicable to other parts of the world." Broiler producers must evaluate their ambient circumstances, housing type, and

overall production goals when deciding on a lighting program. Light has three properties: intensity, photoperiod (duration), and wavelength (color). Broiler growers will recognize the need to provide free access to feed and water to broiler chicks during the first 5-7 days after hatching. Providing adequate light duration, intensity, and distribution during this phase will encourage bird activity, allowing for optimal feed and water consumption and digestive, skeletal, and immune system development, all of which contribute to a healthy flock.

The intensity of the light has a considerable impact on broiler behaviour. Brighter light encourages more activity, whereas lower levels are more effective at preventing violent behaviour that could lead to cannibalism. If given a choice, the chicken prefers to eat during the photoperiod, yet they will eat during darkness if inadequate intervals of light are available. Modern electronic systems are widely used by producers to boost light intensity for short times during grow-out to increase exercise and hence reduce skeletal and metabolic diseases. (Olanrewaju et al. 2014).

The second important aspect of light that influences broiler performance is lighting duration, often called photoperiod. Lighting duration is greatly determined by the age of the hens involved and the type of attempt made to create the best photoperiodic regime.

The wavelength of light dictates its color, which has various effects on broiler production. Blue light is relaxing to birds, while red light increases feather reproduction (Soliman et al., 2020). Light of different wavelengths has varied stimulatory effects on the retina, which might result in behavioural changes that alter growth and development (Lewis and Morris, 2000).

The contribution of the poultry sector to the economy of Ghana

The Ghana Statistical Service's 2010 GDP estimates show that the Ghanaian economy has undergone considerable structural transformation. The agriculture sector, which dominated economic activity for a long time, has given way to the services sector (Etuah, 2014). However, agriculture's numerous sub-sectors continue to play an important role in the Ghanaian economy. The importance of the livestock sub-sector in the Ghanaian economy cannot be overstated, as it is in most African countries. Poultry accounts for 25 percent of total domestic meat production and, along with other livestock, accounts for 7 percent of agricultural GNP (Duffuor, 2010). According to a study by Anang et al. (2013), unlike domestic broiler meat production, which is quite low, Ghana has a high level of domestic egg production.

According to Etuah (2014), the exact number of individuals engaged in Ghana's poultry sub-sector is unknown. However, it is projected that village poultry production benefits over 2.5 million households. In 2007/2008, the number of commercial poultry workers was expected to be around 7000 (Duffuor, 2010). Nonetheless, rising production costs in recent years have resulted in the exit of many poultry farms, as well as the employees in the sub-sector.

The poultry industry is either directly or indirectly linked to other economic sectors such as industries. Many companies supply poultry production inputs such as feed, day-old chicks, medications, chemicals, and vaccines. Other factories/industries produce poultry equipment such as feeders, drinkers, and brooders, among other things (Duffuor, 2010). This suggests that

the chicken sector indirectly employs many people, contributing significantly to the country's economic development.

The Challenges facing poultry production in Ghana

Some problems characterize their activity, just as there are in any firm. The poultry industry is not immune to this threat. Several issues impede the smooth running of their business. Some of the difficulties have been identified in this section.

High cost of feed

The high cost and poor quality of feed ingredients are challenges that many small and medium-sized poultry farmer's encounter. Between the 1980s and the 2000s, the overall number of feed mills decreased from 33 to 10 (Juul & Hemmingsson, 2015). The reduction in the number of feed mills resulted in excess demand, which caused feed prices to rise. Aside from a decrease in their number, most feed millers are producing at or below capacity. They produce approximately 40 to 50 percent of their capability, thereby reducing the quantity produced (Langholtz, 2013). This implies that small and medium-sized poultry producers who rely primarily on feed millers may experience difficulties in gaining access due to the limitation in the quantity of feed produced. The quality of feed mill generated is also questioned because millers are not guided or governed by quality control systems and regulations for feed sample testing.

Thus, while there is growing interest among Ghanaian chicken producers in cutting production costs by lowering feed costs, most of the focus of national poultry policies in Ghana remains tied to the implementation of increased tariffs on poultry imports (Sumberg et al. 2013). The issue of feed-food competition exacerbates the severity of the feed limitation predicament. Maize, which

accounts for around 60% of chicken feed, is Ghana's second most important staple crop. The yield per acre of maize is low, and there are deficiencies in domestic production for human consumption. As a result, there is a continued scarcity of maize for feed consumption, resulting in high feed prices.

Poor quality day-Old Chicks

One important difficulty confronting the poultry sector is the local production of day-old chicks. There are no regulations governing the production of day-old chicks, and as a result, poor-quality day-old chicks are produced. Again, the number of domestic hatcheries decreased from 28 to 10 (VSD, 2013). Due to limited local demand, existing hatcheries are currently producing below capacity (GRAIN Report, 2013). This low level of domestic demand is due to high mortalities documented throughout the brooding period, as well as the birds' poor laying capacity. According to Thomas (2017), instead of buying them locally, domestic farms generally import day-old chicks from Brazil, the European Union, and the United States due to poor disease resilience, high mortality rates, and poor laying abilities.

Imported frozen poultry meant

Domestic frozen chicken meat is less expensive, posing a competitive challenge to domestically produced poultry meat. Only 10% of total broiler market demand is provided domestically, with the remaining 90% imported from the European Union, the United States, and Brazil (USDA, 2013). This is related to the high prices of domestic broiler meat, which cannot compete with cheaper imported frozen meat. Ghana imported 75,160.4 MT of poultry meat in 2012 (MOFA, 2013). This imported frozen chicken meat is less expensive than domestically produced poultry meat and tends to bring stiffer competition to the

domestic industry. According to the grain report, imported poultry meat is typically 30-40% less expensive than domestic poultry meat. All of these things impede the success of the local poultry sector.

Disease and sanitation in poultry husbandry management

Chronic Respiratory, Newcastle, Equalizer, Coccidiosis, and Bird Flu are among the most frequent illnesses affecting the poultry business. Diseases and their control, in general, are said to be a big concern for poultry farmers. Because most of them operate on a small scale, they confront financial hurdles in combating poultry diseases if they are affected. Again, most poultry buildings have poor cleanliness, so it is not unexpected that illness outbreaks occur. Overpopulation of birds, along with poor ventilation and cleanliness, creates the conditions for the already described diseases. Although critical treatments such as continuous vaccination are acknowledged, acquiring access to such services is prohibitively expensive, preventing most farmers from seeking them (Sarpong, 2017).

Access to Finance

Access to finance is a barrier for any firm, especially one operating on a small scale with limited equipment and prospects for expansion. When it comes to accessing capital for both start-up and expansion, the poultry sector is no exception. The capital required to establish a farm business is substantial. Due to the high cost of timber and other inputs, the construction of a brooder house outfitted with all necessary equipment is prohibitively expensive. Financial organizations that may provide such funding are sometimes hesitant to do business with farmers, particularly small and medium-sized farmers, because the possibilities for expansion appear bleak, making it difficult for them to

expand their operations. Those who do agree to loan arrangements with farmers do so at a higher interest rate. The cost of feed materials and additives is always rising, making it more difficult for farms to develop, and some finally abandon their businesses in favour of more profitable endeavours (Sarpong, 2017).

The cost of transporting birds and eggs over long distances to markets, the scarcity of grains and protein supplements, poor technology, death losses, the collapse of processing plants, competition between humans and poultry for grains, climatic conditions, and other factors all pose difficulties for poultry farmers.

Empirical Review

Work-related background characteristics of Agricultural Extension Agents

Akpotosu, Annor-Frempong, and Bosompem (2017) examined the determinants of AEA's internet competencies in the Eastern Region of Ghana. Data were collected from 217 AEAs in ten districts of the Eastern Region, the study used a descriptive survey methodology, stratified proportional sampling, and a validated questionnaire. To characterize or discover links among variables in the study, statistical tools such as frequencies, percentages, means, standard deviation, and relevant correlation coefficients were developed. Age, educational level, marital status, rank, location, years of experience, monthly salary, duration of use, years of using the Internet, and training of AEAs were found to be strongly related to AEAs' Internet competencies. Training, location, duration of use, age, and educational level were the best predictors of AEA Internet competencies.

The study by Namyenya et al. (2022) examined the performance of AEAs and the factors influencing performance. Descriptive statistics and econometric models were used to analyze secondary data. The probit model was employed to estimate the factors influencing performance. Extension managers' performance is favourably influenced by the quantity of extension funding received and their education, however, voter turnout has the opposite impact.

Bahua et al. (2013) studies the factors influencing AEA performance and their impact on maize. The study was "ex post facto," which means it was done after the fact. Thus, 118 agricultural extension workers comprise the smallest unit of observation. Data was gathered through questionnaire-based interviews. The findings revealed that traits, skills, motivation, and self-reliance have a substantial impact on agricultural extension performance. Each variable's coefficient of influence, namely: -0,30, 0,88, 0,22, and -0,31, is significant at = 0,05, coefficient of determination combined with four variables that influence agricultural extension performance by 74%, significant at = 0,05. The performance impact of agricultural extension on changing maize farmer behaviour is 69 percent, with a coefficient of 0.83 significant influence on = 0,05. This suggests that an increase of one unit affects agricultural extension performance to move farmers' behaviour toward better for 0.83 units, especially to enhance competence and maize farmer engagement

Niagi (2016) determined the factors influencing the performance of community-based organisations (CBOs) in the implementation of agricultural extension services. The research was based on stakeholder theory. The descriptive survey research design was used in the study. The target population consisted of 1,870 respondents, including 62 CBO officials and 1,808 registered

members. To classify the CBOs, stratified random selection was employed, with three strata depending on the CBO's main value chain operations. After that, simple random sampling was used to select responders from each stratum. The sample size was 319 people, including 11 CBO officials and 308 CBO registered members. Questionnaires were utilized to collect information from CBO registered members, while an interview guide was used to collect information from CBO officials. SPSS version 21.0 was used to analyze the data both qualitatively and quantitatively. According to the survey, 76.2% of CBOs' agricultural extension initiatives suffered from a lack of community involvement. According to the study, most CBOs operating agricultural extension services programs have put in place procedures to incorporate women in these sorts of initiatives, as evidenced by 85% of respondents. The study also discovered that funding influences the implementation of agricultural extension services projects, with 86.1% of respondents agreeing that CBOs had difficulty raising funds to fund agricultural extension and that projects failed to become self-sufficient after funding organizations/donors withdrew their financial support. 89.4% of respondents agreed that donors impose limitations on grants to run the CBO's project. This study suggests that efforts should be made by CBOs to financially support CBOs to prevent the failure of agricultural extension services initiatives when funders withdraw their funding.

Ametepey (2020) assessed the competencies of AEAs and smallholder farmers adoption of commercial pineapple production. Data were collected from 86 AEAs and 120 farmers using a content-validated questionnaire and interview guide. Data were described using frequencies, percentages, means, and standard deviations, while correlation coefficients and OLS regression were

utilized to relate and predict variables in the study. Farmers apply commercial production technologies such as correct land selection, use of appropriate fertilizers, disease management, and planting double rows along the beds, according to the findings. However, overall AEA and smallholder farmer competence in commercial pineapple production were rated as moderate. Farmers' decisions to embrace commercial pineapple technologies are also influenced by their farming system, gender, and the number of acres of land they cultivate. It is recommended, among other things, that the MoFA and other service providers provide training on commercial pineapple production for AEAs to increase farmers' adoption of commercialized pineapple production technologies.

Luvanda (2015) studied factors affecting job performance of agricultural extension workers (AEWs). A sample of 72 AEWs were randomly recruited for the study utilizing a cross-sectional research design and a self-administered questionnaire. It was also discovered that 55.0% of AEWs with certificate credentials outperform those with higher levels of education in the public sector. The AEWs working in the study area received little logistical help. Furthermore, the share of AEWs with a low volume of work in the public sector was larger than in the private sector. The study found that AEWs had a considerable influence on job performance in both the public and commercial sectors. The findings also revealed that the majority of AEWs in the private sector have a negative impression of job satisfaction. In the public sector, there was a substantial (p0.001) link between AEW perceptions and job satisfaction. AEWs who have a positive perception of job satisfaction do better than those who have a negative perception. It was discovered that AEWs in the public sector were

more knowledgeable than those in the private sector. The study suggests that the government provide greater assistance to newly hired public AEWs to build more demonstration plots since this will inspire them and ease the entire process of knowledge transfer to farmers.

Aregaw, Endris, and Bojago (2023) analyses the factors affecting the competence level of AEAs. The study included both qualitative and quantitative research methods. Using information from the literature and the regional state council's job definition for development agents, six major skill areas were identified. Respondents in this survey were 149 Development Agents (Das) from four districts. The major elements determining development agent competency and desire were assessed using ordinal logistic regression analysis. Development agents outperformed the average in the communication and program implementation skill areas, with total mean scores of 3.51 and 3.24, respectively. Furthermore, they performed poorly in the remaining four competency categories, with information communication technology (ICT) earning the lowest with a mean score of 1.94. Independent variables such as education level, relationship with co-workers and farmers, supervisor's visit, and assessment have a significant influence on extension agent competency, according to the regression model. As a result, competence-specific on-the-job training should be designed to fulfill the DAs' short-term needs. Building social capital and investing in education through curriculum development appears to be more significant than interventions to sustain DAs' agricultural extension competencies, according to the findings. Furthermore, because most DAs are young and have higher ICT competency than senior DAs, digitizing the extension system could yield promising results.

Atuahene, Akowuah, and Adjei (2013) examined the effect of garlic as a natural feed additive on the growth performance of broiler chickens. Fifty people were chosen at random. The findings revealed that most consumers favoured local poultry meat over imported meat. According to the logit estimates, factors such as age, gender, cold storage, cut sections, and healthiness have significant effects on consumers' choice of locally produced poultry meat. Consumer preference for local poultry meat is positively influenced by age, gender, and healthiness, while cold storage and cut pieces are negatively linked. In terms of perception, 68 percent of consumers firmly agreed that local poultry meat is rough, while 58 percent claimed that imported poultry meat is tough. In terms of pricing, 46 percent of customers disagreed that local poultry meat is affordable, while 52 percent strongly disagreed that imported poultry meat is considerably cheaper. In terms of availability, 54 percent of customers stated that local poultry meat is not easily accessible, but 58 percent stated that imported poultry meat is easily accessible and can be purchased at any time. Sixty percent of respondents said that local poultry meat tasted better, while 46 percent thought that imported poultry meat did not taste better. This was most likely due to prolonged refrigeration, which diminished its freshness and taste and made it less nutritious to consume. It is advised that the government subsidize the cost of inputs for the local chicken sector, as the findings revealed that high cost was the primary factor influencing customers' purchase decisions.

Level of Competency in poultry husbandry

Okeoghene (2013) studied the competency level and training needs of poultry farm attendants. To create a sample size of 225 respondents, a multi-stage sampling process was used. A four-point Likert-type scale with values of

1=not competent, 2=little competence, 3=competent, and 4=very competent was also included in the core data collection instruments. To analyze the data, descriptive and inferential statistical approaches were applied. Tables and simple percentages were used to present the results. The results revealed that the attendants were only competent in three of the twelve jobs tested. The attendants were proficient in the following tasks: caring for poultry equipment (mean = 4.48), identifying unwell birds for culling (mean = 4.46), and identifying poultry breeds (mean = 4.90). As a result, the poultry farm attendants were often incompetent. It was, therefore, highly advised that a training workshop on the remaining nine tasks be arranged to train poultry farm attendants to increase their level of competence.

Ibrahim-Olesin et al. (2023) assessed poultry workers' management competencies. A multi-stage sampling procedure was used to choose the respondents. The third stage involves a proportionate sampling of 70% of the sample population, yielding 156 respondents. The average age of the respondents was 26 years old, and the majority (51.30%) held a Senior School Certificate. After being hired, the majority of respondents (98.1 percent) got training, with monthly training being the most common (49.4 percent). 5401 chickens were raised on average per worker. Disease prevention (MWDS = 0.00967), flock record-keeping (MWDS = 0.00919), identifying ectoparasites (MWDS = 0.00839), identifying indications of disease (MWDS = 0.00788), and day-old chick care (MWDS = 0.00737). It concludes that workers are competent in some behaviours but not others, and the study suggests that poultry management training covers the highlighted practices for effective management.

The study by Agege and Olaitan (2020) analysed the competency needs of secondary leavers for entering the brooding of turkey poults to grower's enterprises for sustainable growth. A descriptive survey research design was used. The study's population included 424 people, including 245 teachers of agricultural science, 35 registered turkey farmers, and 144 agricultural extension agents from the state's three senatorial districts. The study's sample size was 230 people, including 123 agricultural science professors, 35 registered turkey farmers, and 72 agricultural extension agents. Teachers of agricultural science and extension agents were chosen using a proportionate (50%) stratified random selection technique, while the complete population of registered turkey producers was used in the study due to its manageable size. A questionnaire was utilized to collect data. The data was examined using mean and standard deviation, and Analysis of Variance (ANOVA) was employed to test the null hypothesis of no significant difference. The study's findings revealed 9 competencies in planning, 16 competencies in brooding turkey poults to growers, 9 competencies in selling matured turkey growers, and 14 competencies in facilities required for brooding turkey poults to growers' enterprises. It was therefore recommended that curriculum developers incorporate the study's findings into secondary school animal husbandry curricula and that the government direct administrators of skill acquisition centers to integrate the competencies in brooding of turkey poults to growers enterprise for training unemployed secondary school leavers and other interested youths.

Yusuf, Lategan, and Masika (2014) assessed skill gap analyses of the farmers and agricultural development technicians on indigenous poultry

production. Data were collected from 312 indigenous poultry-rearing households in 14 villages and 33 ADTs. Thirty-two skills items were utilized as a checklist of competency levels, with ratings ranging from bad (1) to outstanding (5). On the data acquired for the Indigenous Poultry Farmers (IPFs), descriptive statistics and exploratory Principal Component Analysis (Orthogonal rotation technique) were done. IPFs demonstrated abilities in nine skill categories, including the capacity to recognize chicken predators (Mean =3.92), use of ethno-veterinarian medications to treat chicken diseases and pests (Mean =3.72), and identify indications of diseases (Mean =3.69). The agricultural development technicians, on the other hand, demonstrated no competency in any of the 32 skill items. Six factors with eigenvalues greater than one were retrieved, accounting for 77.317% of the total, with factor loadings ranging from 0.523 to 0.93. Brooding, shelter, and chick care were described as factor loading following rotation: Predators and Healthcare; Hygiene and Litter Management; Feeds and Feeding Stuff; and Record Keeping and Marketing. It is advised that comprehensive training be provided to both IPFs and ADTs to scale up indigenous poultry husbandry management.

Adisa (2015) studied livestock extension practice and competency among agricultural extension agents. A standardized questionnaire with positively presented livestock extension practice and competency items on 5-point Likert-type scales was used to collect data from 112 randomly selected AEAs. For each respondent, a Livestock Extension Competency Coefficient (LECC) was calculated. The test-retest technique was employed to pre-test the instrument, and the coefficient r=0.91 was obtained. Data was analyzed using descriptive, correlation, and t-test statistics. According to the findings, around

40% of respondents engaged in livestock extension activities in the previous two years, while approximately 16% specialized in Animal Production while in school. Respondents reported broad competency in several elements of cattle production, such as feeding, handling, housing, and production management systems. Respondents cited less competence in sire selection, breeding, disease, pest control, and so on. Job experience, interaction with farmers, number of training attended, and level of job satisfaction were all significant indicators with LECC. Respondents highlighted limited LE programs, financing, inadequate training, and a lack of subject matter specialists as major LE restrictions. The study concluded with recommendations on how to overcome the limits and low levels of LE activities effectively.

The study by Amir et al. (2016) examined poultry farmers' competencies regarding the diagnosis and treatment of poultry diseases. A cross-sectional survey was conducted. Tehsil Mansehra was chosen from among three tehsils: Balakot, Mansehra, and Oghi. The data was gathered using a combination of quantitative and qualitative methodologies, and a simple random sampling strategy was utilized to collect samples from thirty (30) commercial chicken farms. According to the respondents (poultry farmers), the most dangerous illnesses in the research area were new castles, hydropericardium, coryza, and gumboro. At an average level, poultry farmers were aware of the treatment and control strategies for new castles, hydropericardium, and Gomboro. In terms of the specific illness situation, understanding of detection and control among prevalent diseases was lowest in the case of coryza, despite its high prevalence rate on chicken farms. It is advised that local farmers receive training in the

diagnosis and treatment of poultry diseases to reduce losses caused by a lack of awareness in dealing with these dangers.

Yusuf (2014) studied the modelling of indigenous poultry husbandry management. The study included a multi-methods approach, as well as quantitative and qualitative research methodologies. The quantitative data analysis employed descriptive statistical analysis, frequent count, percentage, means, standard deviation, chi-square, and principal component analysis, while the qualitative methodology employed the "open social system.". According to the findings, indigenous poultry farmers confront several obstacles, including substandard housing that exposes the birds to inclement weather, predator assaults, and stock theft, high mortality of chicks after hatching, and expensive feed for the flock. The indigenous poultry farmers demonstrated competency in nine skill items, including the ability to identify chicken predators (Mean =3.92) and high-yielding chickens (Mean =3.79); predator control (Mean =3.77); methods of using ethnoveterinary drugs to treat chicken diseases and pests (Mean =3.72); and identify signs of diseases (Mean =3.69). However, the ADTs demonstrated no competency in any of the skill items. According to the findings on human resource development, staff meetings were the most popular way of capacity building. Following this, there was in-service training, formal study, a workshop, and on-the-job training.

Sasidhar and Suvedi (2018) assessed the core competencies of veterinarians. The survey findings come from in-depth questionnaires completed by 270 veterinary assistant surgeons (VASs) in nine districts across three states in 2015-2016. The findings demonstrated that VASs' existing level of knowledge and/or abilities in the production, para-clinical, and clinical

sectors was insufficient in their day-to-day employment. The findings suggested that attending national and international seminars, workshops, and Webinars, as well as pre-service, in-service, and basic induction training, are appropriate strategies for learning competencies. Respondents also viewed time and stress management skills, motivational approaches, digital communication tools, and writing and presentation skills as vital.

Challenges to poultry husbandry

Banson, Muthusamy, and Kondo (2015) studied the import-substituted poultry industry in Ghana. Data for the study were gathered from primary sources, routine interviews, and secondary sources attributed to the Ministry of Food and Agriculture's Poultry Unit, the University of Ghana Farms, and Abundant Grace farms at Dodowa in Ghana's Eastern region. The research was also based on the stakeholder theory of organizational management and business ethics, which focuses on the values and morals involved in running a corporation. The findings highlighted the importance of Feed Conversion Rate in lowering production costs and boosting broiler growth efficiency. The BNARI feed conversion rate for broilers is 1.56 kilograms of feed required to create one kilogram of live weight, compared to 2.12 kilograms of feed required to produce one kilogram of live weight by other poultry farmers participating in the study. Feed expenses account for more than 70% of overall broiler production costs, and feed utilization efficiency is crucial for broiler growth rate. A major limitation is the Ghana government's lack of protection for the infant poultry sector, which leads to unfair competition with cheap imported poultry products that are 30-40% cheaper, undermining the expansion of the local business. Other obstacles include high feed costs, significant chick

mortality due to power outages during brooding, feed and water pollution, and consumer preference for imported poultry meat. There is still 74% of the demand market share to be supplied. The Ghana poultry sector is insecure because chicken farms are failing quicker than new farms are built or existing farms are expanded. To reverse this trend, the government must intervene forcefully through regulations and enforcement.

Kusi et al. (2015) examined the challenges and prospects of poultry farms in Ghana. The descriptive survey method was used as the research design, and 87 questionnaires were self-administered to the managers and/or owners of the region's current commercial chicken firms. A 100% response rate was recorded. SPSS Version 17.0 was used to analyze the collected data. The study's findings revealed that the poultry industry faces numerous challenges, including high energy costs and erratic power supply, high transportation costs, high material costs, financial constraints, limited support from the central government, fierce competition from well-advanced foreign firms, and limited supporting industry in the value chain system. Because of the existing situation of the commercial chicken sector, prospects were graded "Less Promising." To prevent the sector from degrading or collapsing, immediate preventive measures are essential.

Anang, Yeboah, and Agbolosu (2013) determine the profitability of broiler and layer production in Ghana. Data were gathered from farm production records as well as questionnaire distribution. Profitability analysis was performed utilizing the cost, revenue, and profit functions to get total cost, total revenue, and total profit. The Kendall's coefficient of concordance was used to examine constraints. Despite significant production limits, the results revealed

that both broiler and layer production were economical. Inadequate financing and scarcity/high cost of maize were the key limitations related to layer production. The main constraints for broiler production were insufficient financing and competition from imported frozen chicken. Access to credit, extension education, and production technique training have all been suggested as ways to boost commercial chicken production in the country.

Adei and Asant (2012) analyses the challenges and prospects of the poultry industry in Ghana. Thus, 45 poultry farms and 10 significant poultry input suppliers from the study area were chosen at random for the survey. Primary data were collected through the use of questionnaires, semi-structured interviews, and observations. The District Veterinary Services Division, the District Assembly, and the chicken Farmers' Association also provided secondary statistics on chicken farming. According to the poll, the biggest obstacles faced by poultry producers included financing, diseases, and the lack of electricity for operations in the majority of farms (84.4%). The presence of feed processing mills, poultry input shops, and the availability of organized markets served as opportunities for the district's poultry sector to flourish.

Takyi-Mensah (2012) studied constraints to production, distribution, and consumption. A multi-stage sampling technique was applied, with basic random being used to choose farmers and snow-ball being used to select buyers and sellers. This amounted to 36 poultry producers, 72 poultry meat vendors, and 108 poultry meat customers, for a total of 216 study participants. To assess supply and demand for locally processed poultry meat, a linear multiple regression model and the Ordinary Least Squares approach were utilized. Kendall's Coefficient of Concordance was also employed to rank the constraints

in terms of severity. Disease outbreaks, the relatively high price of locally processed poultry meat, and high average input costs all had a substantial impact on the supply of locally processed poultry meat. In descending order of severity, high average input costs and low tariffs on imported poultry meat were production restrictions. The price of locally processed poultry meat, consumer income, the proportion of consumer money spent on poultry meat, and cultural considerations all had a role in the demand for locally processed poultry meat. Consumption was restrained in decreasing order of severity by relatively higher prices of locally processed poultry meat and relatively lower prices of imported processed poultry meat. The sequence of severity of the limits was agreed upon by poultry farmers, merchants, and consumers. The study recommended that the Ministry of Trade and Industry should consider imposing high taxes on imported processed poultry meat, and poultry producers should employ more efficient manufacturing technologies.

Atuahene et al. (2010) examine poultry production in Ghana. The poultry business is an important contributing sector in agriculture, with a significant impact on income generation in both the rural and urban economies of the country; nonetheless, the industry is beset by numerous issues that stymie its growth and development. The poultry industry's major difficulty is one of management and decision-making. Most farmers rely only on knowledge gained from the old technique of bird rearing, which is inefficient. The birds are often raised in a free-range production manner, exposing them to diseases and pests. Some farmers also leave their enterprises in the hands of family and, in some cases, acquaintances, who may disregard certain critical activities such as feed formulation and immunization, resulting in infertility and low productivity

of the birds. Like many others, Atuahene et al. (2010) contended that the Ghanaian market is swamped with inexpensive imported poultry goods from the European Union, the United States of America, and Brazil. These imported items have lowered demand for local poultry, jeopardizing the livelihoods of many small, medium, and large-scale poultry producers in Ghana. Furthermore, inadequate capital to finance the business is another issue that chicken farmers face. The high expense of supplies such as feed and medicine required to care for the birds, along with the inability to get money, causes poultry producers to forsake the sector in favor of more lucrative ventures. Other significant issues addressed in the report include the transportation of birds from considerable places to be sold. The birds generally die from heat stress and weakness during the journey, thus farmers must provide extra birds to customers who buy from them to compensate for any losses during transit. Farmers' profits suffer as a result of high transportation expenses.

Adeyemo and Onikoyi (2012) assessed the prospects and challenges of large-scale commercial poultry husbandry management in Nigeria. According to the survey, poultry farmers did not have enough money to buy excellent feed for their birds. As a result, they had to rely on cheaper, lower-quality feed. The lower-quality feed is made from raw materials that have been improperly processed and managed. According to the data, poultry farmers in Nigeria do not have simple access to veterinary services. Most farmers in the country, who are confined to rural areas, find it difficult to obtain veterinary services for their birds since they are either few in the area or non-existent. The survey also discovered that the Nigerian poultry industry faced intense competition from imported birds. Local poultry producers are having to compete with imported

cheap poultry goods in an attempt to cover the demand imbalance for poultry meat. The demand for poultry products far outstripped local supply, so the importation of poultry products was encouraged to meet the demand. However, the exercise was not properly supervised, and it spiraled out of control, making it difficult for locals to sell their produce because imported products are cheaper.

Adetayo, Ademiluyi, and Jennifer (2013) examine the challenges of small poultry farms in layer production. The findings revealed that illnesses and pest attacks had hampered the chicken industry. Small-scale poultry farmers were unable to detect illness symptoms early enough to avert epidemics. As a result, more birds die on farms, lowering the total output of poultry production in developing countries. Farmers relied primarily on expertise passed down from generation to generation and did not take use of the restricted extension officer services. Again, the poultry producers were unable to obtain loans or other financial aid. The study also concluded that poultry farmers who had access to financial aid were unable to acquire loans from banks because they (financial institutions) either refused to do business with them (the farmers) or charged exorbitant interest rates. The high cost of feed was another key impediment to the chicken industry's expansion. Poultry farmers were unable to obtain high-quality feed for their animals due to high costs.

Conceptual Framework for the Study

Figure 2 depicts the conceptual framework of the study. The conceptual framework explores the relationship between the perceived competencies of farmers, the nature of poultry production, socio-demographic characteristics of both farmers and Agricultural Extension Agents (AEAs), and the challenges faced by AEAs and farmers. Using

Durand's theory of competencies, the framework illustrates how these elements interact to influence poultry husbandry management. According to Durand, competencies are shaped by individual attributes, task demands, and environmental factors.

The socio-demographic characteristics of farmers, such as education level, farming experience, and age, directly impact their perceived competencies. Farmers with higher education or extensive experience may possess better knowledge, skills, and abilities for effective poultry management. Similarly, the nature of poultry production, which involves feeding, disease control, and housing systems, requires specific competencies to address the complexities of poultry farming. This connection highlights that the operational context determines the level of competency required for successful management.

The challenges faced by AEAs and farmers, such as limited access to resources, inadequate extension services, and disease outbreaks, also influence farmers' perceived competencies. These challenges can hinder farmers' ability to apply knowledge effectively, reflecting Durand's notion that external factors impact the development and utilization of competencies. Furthermore, the socio-demographic characteristics of AEAs, such as their educational background and experience, play a crucial role in addressing these challenges. Experienced and knowledgeable AEAs are better equipped to transfer essential skills to farmers, enabling them to manage their farms effectively.

The socio-demographic characteristics of farmers also influence the nature of poultry production. For instance, farmers with better education and

farming experience are more likely to adopt improved management practices, ensuring efficient production. Similarly, the interaction between the nature of poultry production and the challenges faced by AEAs and farmers demonstrates that complex production processes, such as disease management and market access, require enhanced competencies to address emerging issues.

Finally, the framework emphasizes the mutual influence between the socio-demographic characteristics of farmers and AEAs. Farmers' characteristics determine their ability to engage with AEAs, while AEAs' traits influence their effectiveness in disseminating knowledge and addressing farmers' challenges. Therefore, this conceptual framework highlights the need to address socio-demographic gaps, improve farmer competencies, and resolve production challenges to enhance poultry husbandry management and productivity.

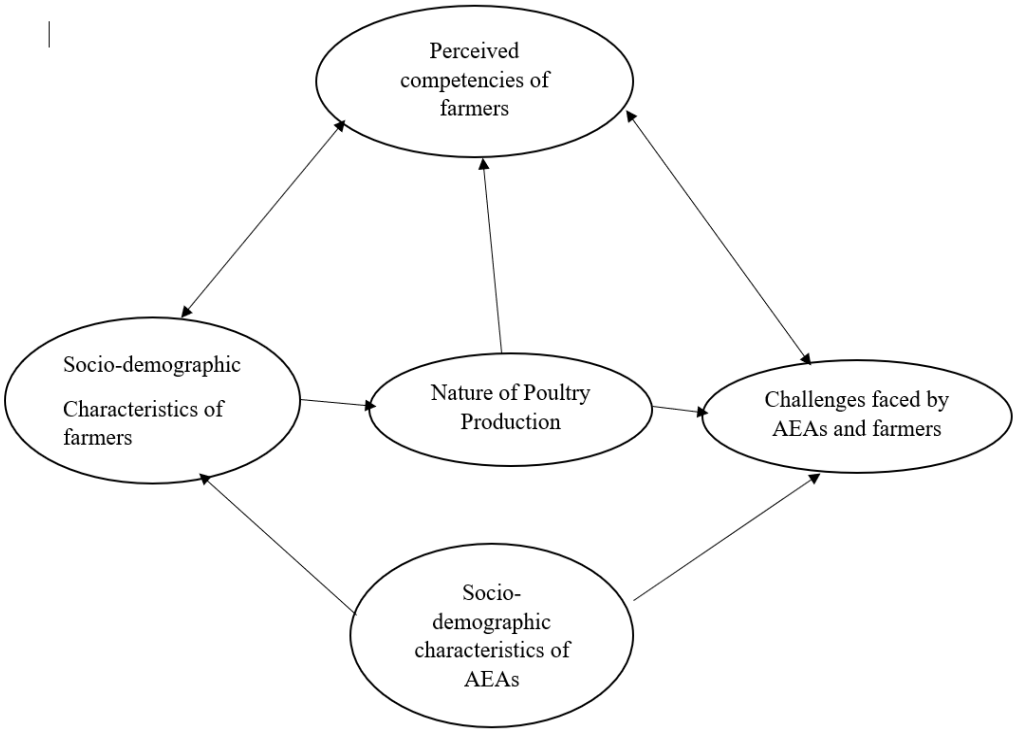

Figure 1: Conceptual Framework showing *the relationships between competency, nature of poultry production, socio-demographic characteristics and challenges faced AEAs and farmers.*

Source: Authors Construct, 2021

CHAPTER THREE

RESEARCH METHODS

Chapter Three is devoted to various procedures and techniques that were employed in conducting the research. The items included in the Chapter are; the research design, study area, study population, sampling procedure, data collection, and procedure. Data processing and analysis were also included in the chapter. The chapter ended with a chapter summary.

Research Design

Research design is the strategic framework that serves as the link between the research question and the implementation of the research (Carcary, (2020). A good research design integrates the different components of the research study in a well-coherent and logical way to solve the research question. According to Apuke (2017), the research design constitutes a data collection and analysis blueprint. The correlation survey design was selected for the study. The correctional survey design enables the researcher to describe the population and select an unbiased sample to respond to the research question. Hauber et al., (2016) found that the correlational survey design offers a kind of analysis to formulate and test hypotheses. Furthermore, it follows the logical method of inductive-deductive reasoning to arrive at generalization. According to Sarantakos (2012), the design allows for determining the best predictors of the dependent variables from given independent variables that describe the current conditions and practices and make comparative evaluations of variables. This design is appropriate because it allows the researcher to collect data from a sample population and analyze the extent to which two or more variables are related without manipulating any of the variables. Again, the correlational

survey design is a suitable method for this study as it provides a structured framework to analyze complex interactions among variables, generate insights

Study Area

The study was conducted in the Awutu Senya West, Gomoa East, and Agona districts of the Central Region. The Awutu Senya District West is located in the South-Central Region of Ghana with its capital being Awutu Bereku. The district covers an estimated land area of 244, 472 sq. km (Ghana Statistical Service, 2012). It is bounded to the west by Gomoa East and Agona East district, east by Awutu Senya East, northeast by West Akim district, and south by the Gulf of Guinea. The area is characterized by isolated highlands with the coastline, mainly lowland with isolated hills. The district has the Ayensu and Okrudu rivers flowing through it to Winneba. The climatic condition of the area favours the production of poultry within the range of 22^{o}C to 38^{o}C. The district experiences two seasons, thus the rainy and dry seasons. The major rainy season starts from April to July with the minor season being August to November. The main economic activities of the district are farming, fishing, and ceramic and pottery. The district is also engaged in livestock production. This includes sheep, goat, poultry, pig, and cattle production. Poultry production outnumbers all other livestock output. Despite the district's significant poultry production, the district continues to face challenges such as insufficient quality feed, poor management practices, fewer watering points, particularly dams and dug out during the dry season, occasional shortages of feed ingredients for commercial poultry farmers, insufficient credit, and disease outbreaks (MoFA, 2023).

The Gomoa East district is one of the twenty-two districts of the Central Region. The district covers 539.69 square km with a population of 207,071. It

lies within the latitudes 5º14'N and 5º35'N and longitudes 0º22'W and 0º54'W. The district is bounded by North-East by Agona East, South-West by Gomoa West, east by Awutu Senya and Ga south in the Greater Accra Region, and Effutu to the south. The vegetation cover of the area is the dry coastal savannah and the moist semi-deciduous forest. The main economic activity of residence is farming, livestock, and fishing. The highest proportion of farming households are engaged in crop farming followed by households engaged in livestock rearing. In terms of livestock production, the majority of the farmers are engaged in commercial poultry production. There are approximately 64.8 percent of chickens being reared by 54.6 percent of the population. Despite the significant population engaged in poultry production, there is an issue of inadequate space allowance per bird, leading to increased stress, aggression, and competition among birds for limited resources such as water, food, and space. This often results in the spread of diseases due to close contact and limited ventilation (MoFA, 2022; GSS, 2021).

The Agona East District is one of the twenty-two MMDA of the Central Region, with Agona Nsaba being its capital. The district is located within the latitudes 5º30' and 5º50N and longitudes 0º35' and 0º55'W. It covers a land area of 667 sq. km, with an estimated population of 85,920 (GSS, 2012). The main economic activity of the district is agriculture (farming, livestock, and fishing), which engages about 50.6 percent of the population. The major crops cultivated are food crops and cash crops, while the major livestock reared in the district is poultry (chicken). Poultry is the most common livestock reared in the district, followed by goat rearing. Poultry constitutes 53.2 percent of all livestock reared in the district and engages 44.5 percent of livestock keepers.

The poultry industry in the district continues to face overcrowding of birds because of inadequate space for birds which leads to stress and reduced productivity. However, as a result of inadequate space and proper ventilation lead to heat stress, respiratory problems, and increased susceptibility to disease (MoFA 2022; GSS, 2021). Figure 2 shows the map of the study area.

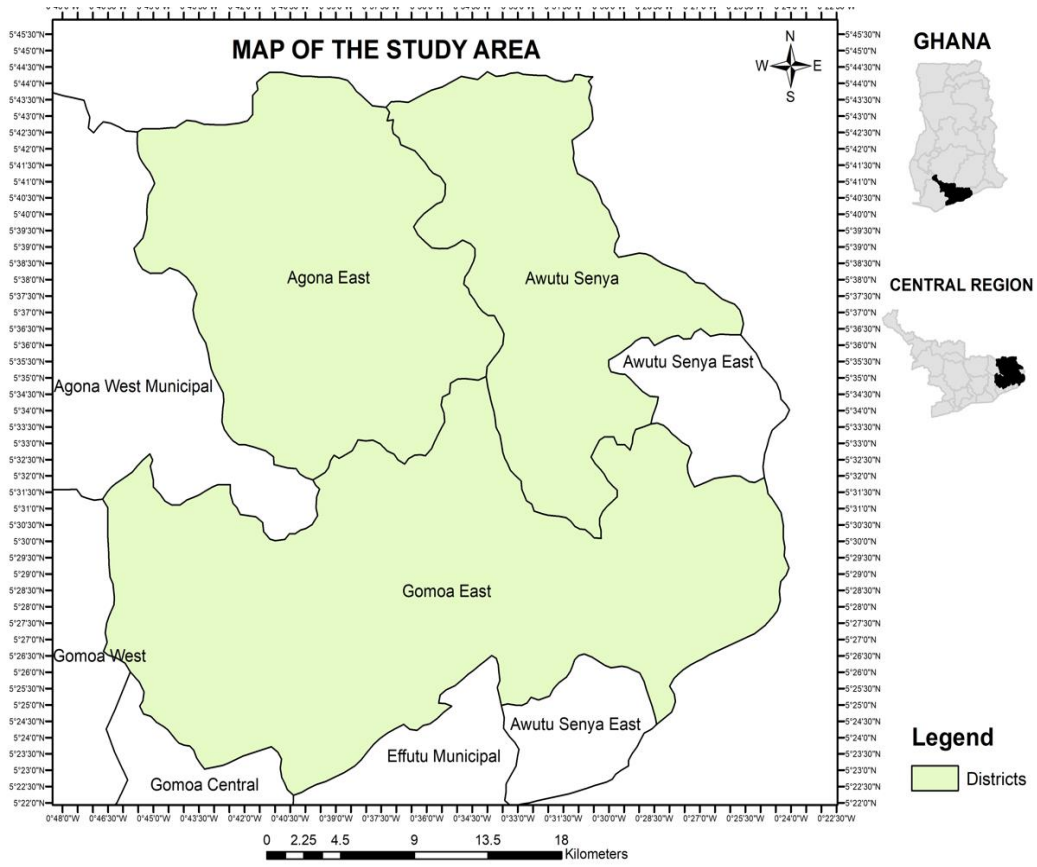

Figure 2: Map of Awutu Senya West, Gomoa East, Agona East

Source: (Department of Geographic and Regional Planning, (2021), Ucc.)

Study Population

A population is the aggregate of people or things that researchers have in mind from which one can obtain information and draw conclusions (Sharma, 2017). The population of the study was all agricultural extension agents (AEAs) and all registered poultry farmers of the Departments of Agriculture in the Awutu Senya West, Gomoa East, and Agona East (Table 1).

Table 1: Study Population of farmers and AEAs in the varies District

District	Registered farmers	AEAs
Awutu Senya West	30	5
Gomoa East	60	5
Agona East	40	1
Total	**130**	**11**

Source: MoFA (2020)

Sampling Procedure and Sample Size

The sample size is a subset or a portion of the total population while the sampling procedure is how the researcher selects a representative sample (Etikan, Alkassim, & Abubakar 2016) A good selection of units of interest ensures fair generalization of results on the population from the sample chosen (Trochim, 2006). A census is a carefully planned process for acquiring, documenting, and analyzing data about the population's members. Every single unit of the universe is counted in this official and comprehensive count of the cosmos. Here, the term "universe" refers to any geographic area (such as a city or country) or population that can be used to collect data. With the help of this method, the population is counted while considering every single person. To obtain information from every single unit of the population, this strategy needs a lot of time, money, and labour.

The survey used in this study to get the data covered all 130 poultry farmers and 11 AEAs within the study area. Given the small size of the population and the ease with which it could be accessed to gather data, a census seemed a viable method to use for this study.

Data Collection Instruments

Instrumentation

Face and consent validated structured questionnaire and an interview schedule targeting AEAs and poultry farmers (Appendix A and B) respectively were used as instruments for the study. The instruments were constructed based on the objectives of the study. The interview schedules for farmers were divided into five sections.

Section A focused on the nature or state of poultry production and captured data on the poultry production systems, the number of birds owned by the farmers, the structure used, the operation of the farm, and the main sources of supply of day-old chicks for production.

Section B captured data on socio-demographic and background characteristics age, sex, household size, farm size, educational level, years of education, source of input, credit, and information on poultry production, primary occupation, and status in the household.

Section C focused on the perceived competencies of the farmer. This section involved an assessment tool where each competency was listed, and farmers rated both the importance on a scale of 1 to 5 and their proficiency on a scale of 1 to 5.

Section D was divested to the challenges faced by farmers in the implementation of production management procedures. The farmers rated the input, production, marketing, and policy constraints as 1 =very low, 2 = low, 3 = moderate, 4 = high, very high 5).

Agricultural Extension Agents

Section A of the AEA interview schedule focused on background characteristics age, educational level, years of experience, and sex. Finally, section B covered the challenges the AEAs faced in the quest to deliver their service.

Pre-testing of Instruments

The instruments were pre-tested to determine their reliability and validity. During the pre-testing, efforts were made to identify possible errors in framing questions such as misleading questions, double questions, and repeated questions to ensure the instruments were more readable, clear, relevant, and understandable to the respondents. The research instruments were also pre-tested to reduce discrepancies, ambiguities, and deficiencies of the items and to check the internal consistency of the Likert-type scale items on the instrument (Alumode, 2011). The data collection instruments were pre-tested from 2nd to 26th February 2022 with thirty farmers and five AEAs interviewed in the Mfantsiman districts. The researcher together with his team interviewed the interviewers during the training to provide an example of the interview process while a structured questionnaire was administered to the AEAs themselves to fill.

The parts of the instruments that contained the Likert-type scale items were entered into Statistical Package for Social Sciences (SPSS) version 23.0 to generate Cronbach's Alpha Coefficients. The Alpha Coefficients ranged 0.75 to 0.86 from for the farmers and AEAs. According to Pallant (2020) reported items on an instrument are considered to be reliable, if the Cronbach's Alpha coefficient is or more value for the research instrument. The reliability of the

instruments from the pre-test is in line with that of Pallant (2020). Table 2 presents the results of the Cronbach's Alpha Coefficient of the variables used in the study.

Table 2: Cronbach's Alpha Coefficient of Variables

Variables	Number of Items	Cronbach's Alpha Coefficient
Competency	21	0.86
Level of challenge in poultry production	20	0.85
Challenges of AEAs	10	0.83

Source: Field Survey, Abdoni (2021)

Data Collection Procedure

A one-day training was organized for four enumerators on how to administer the instrument after approval had been sought from the Institutional Review Board (IRB) office. The training equipped the enumerator with the requisite skills to reduce biases and errors during the data collection exercise. The researcher together with the four trained enumerators conducted the data collection exercises. Since the survey was primarily conducted for academic purposes, the respondents received assurance that the information they provided would be kept as secure as possible.

The data collection for the study took a maximum of three weeks, which occurred between the months of March-June 2022. The respondents were interviewed in their offices or on farms. The enumerators interviewed and wrote the responses in the instruments for respondents who could not read and write. For the AEAs, the questions on their instrument were read to them and explained before they filled the instruments themselves. The response rate was, therefore, 99 percent.

Ethical Consideration

The instrument and proposal were submitted to the University of Cape Coast Institutional Review Board (UCCIRB) to check validity and reliability and also to ensure that the respondents were not put into any risky or uncomfortable situations during data collection. Options were made for suggestions to be accepted or declined to share specific details. In other words, IRB ensured that for respondents, participation in the research was entirely voluntary. Moreover, the researcher protected the confidentiality and integrity of the research by keeping the data well and using it for research only. Appendix C is the response from IRB on the integrity of the instrument.

Data Processing and Analysis

Table 3 presents appropriate statistics on the variables according to the objectives of the study.

Table 3: Analytical framework for variable of the study based on objectives

Objective	Statistical Tool
The background (social, demographic, economic, and poultry-related) characteristics of poultry farmers and extension agents	Frequency, percentage mean, and standard deviation.
The state of poultry production in the study	Frequency, percentage mean, and standard deviation.
The challenges in the poultry industry in the study area from the perspective of farmers	Kendall's concordance coefficient
The challenges faced by the AEAs in the quest to execute their responsibility	Kendall's concordance coefficient
The perceived competencies of poultry farmers in poultry husbandry management	Mean and standard Deviation.
The factors influencing the perceived competency of poultry farmers	Regression

Model Specification

Ordinary least square regression

Ordinary Least Squares (OLS) regression is a statistical technique used to establish a mathematical model that describes the relationship between a dependent variable and one or more independent variables. The objective is to determine the values of the parameters in the linear equation that provide the most accurate predictions for the dependent variable. The dependent variable refers to the outcome of a study or experiment, whereas independent variables, also known as predictors or regressors, are the elements that influence or affect the dependent variable (Jones & Jaeger, 2019; Lee & Kim, 2019). The nature of the independent variable can be categoric, continuous, and confounding. The mathematical presentation of the equation is as follows;

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots \ldots \ldots \ldots \ldots + B_n X_n + e_i \ldots\ldots\ldots\ldots\ldots\ldots 1$$

Y = is the dependent variable.

β_0 = is the intercept term (the value of Y when all X variables are zero

β_1 , β_2, B_n= are the coefficients that measure the change in Y for a one-unit change in X_1, X_2 and X_n.

e_i = is the error term

The regression model was used by Lee and Kim (2019) to estimate the factors influencing consumer spending in emerging markets. Similarly, this study also made use of the regression model to estimate the factors influencing the competencies of poultry farmers. The empirical model for the study is specified as;

$$Y = \beta_0 + \beta_1 Age + \beta_2 Sex + \beta_3 Credit + \beta_4 Farm\ Size + \beta_5 Household\ Size + \beta_6 Education + \beta_7 Extension + \beta_8 Marital\ status$$

……..(2)

Measurement of Competency

The Borich Competency Needs Assessment Model is a widely used framework for identifying training and development needs among professionals. Developed by Gary Borich in the late 1970s, this model helps to systematically assess the gap between the current competency levels of individuals and the required competencies for effective job performance. The model involves a dual-rating system where respondents rate both the importance of specific competencies and their proficiency in those competencies. This dual approach allows for a detailed analysis of where training is most needed. The core of the Borich model is the Mean Weighted Discrepancy Score, which is calculated by weighing the discrepancy between the importance and proficiency ratings. Higher MWDS values indicate greater training needs.

First, the essential competencies required for effective poultry husbandry management were identified. These include knowledge and skills related to nutrition, disease management, housing, breeding, waste management, and marketing. Second, a survey or questionnaire that asks farmers to rate both the importance and their current competency level for each identified skill or knowledge area was designed. For example, the farmers were asked to rate the importance of knowledge in poultry disease management on a scale of 1 to 5, followed by rating their current competency in poultry disease management on a scale of 1 to 5. Third, the Borich model was used to calculate the mean weighted discrepancy score (MWDS) for each competency. This

involves multiplying the importance rating by the difference between the importance and competency ratings. The formula is presented as:

MWDS = Importance Rating * (Importance Rating - Competency Rating).

Competencies with the highest MWDS are considered the highest priority for training. The competencies are ranked based on their MWDS. The higher the MWDS, the greater the need for training

Kendall's coefficient of concordance

Kendall's coefficient of concordance was used to rank the various challenges to know the most limiting challenge to the farmer. Although, there are ranking methods such as Freedman and Spearman ranking methods. However, Kendell's coefficient of concordance was used because of the small asymptotic variance that makes it efficient and the small gross error sensitivity that makes it more robust (Koufie, 2020).

Kendell's coefficient concordance is a non-parametric statistical measure used to identify a given set of constraints, from the most limiting to the least limiting constraints, and to measure the degree of agreement among the respondents.

The challenges were to identify the high cost of feed, poor quality day-old chicks, high cost of medication, unavailability of transport, and inadequate credit facilities were ranked from the most challenging to the least limiting challenge using numerals (1, 2, 3, 4, and 5). The challenge with the lowest score was ranked as the most challenging while the challenge with the highest score was ranked as the least challenging. Therefore, Kendall's coefficient of concordance according to Anang et al. (2013), is algebraically presented as follows;

W- $\frac{12S}{m^2(n^3-n)-pT}$ 3

S- Sum of squares from row sum of ranks R_i

n- Number of objects

p- The number of judges

T- Correction factor for tied ranks

Therefore, S- $\sum_{i-1}^{n} R_i^2 - SSR$ (4)

T- $\sum_{k-1}^{m}(t_k^3 - t_k)$ (5)

m- Number of groups

t_k – the number of tied ranks in each k of m groups

Kendall's Coefficient concordance (W) was then tested for significance in terms of the F-distribution. The F-ratio is presented as follows;

F = $[\frac{(m-1)w}{(1-w)}]$

Variables and Measurement and Expected Sign

Table 4 shows the variables and how they are likely to affect the outcome of the study. The independent variables used in the study to run the stepwise regression include age, sex, marital status, access to credit, extension service, and household. The dependent variable of the study was competency.

Table 4: Variables and Measurement and Expected Sign

Explanatory Variable	Scale of Measurement	Coding	Expected Sign
Age	Scale	Number of years	-
Sex	Nominal	1- Male, 0- Female	+/-
Marital status	Nominal	1- Married, 0- Unmarried	-
Primary occupation	Nominal	1-Farming, 0- Non-farming	-
Access to credit	Nominal	1-yes, 0- No	+
Access to input	Nominal	1-yes, 0- No	+
Access to information	Nominal	1-yes, 0- No	+
Farm size	Scale	Total land size in acres	+
Income source	Nominal	1- farm income only and 0 - Non-farm income	+
Contact with extension agents	Nominal	1-yes, 0- No	+
Household size	Scale	Members of the farm household	-
Landholding	Nominal	0- Own, 1- otherwise	+
Farming experience	Scale	Years of farming	+
Dependent Variable			
Competency	Scale	Levels	+

Source: Abdoni (2021).

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

The Chapter presents and discusses the study results based on the study objectives. The discussion is supported by relevant literature. The section included; socio-demographic and work characteristics, the state of poultry production, the challenges faced by farmers, the perceived competencies of poultry farmers in poultry husbandry management, and factors that influence competency.

The Background (Social, Demographic, and Economic) Characteristics of Poultry Farmers and Extension Agents

Sex of Poultry Farmers

The result on the sex distribution of farmers presented in Figure 3 revealed that the majority (88%) of the farmers in poultry production were males compared to female (12%) counterparts. Poultry production is seen as physically demanding or requires masculine abilities. Men are therefore more inclined to pursue professions in poultry production, whereas women are more inclined toward the marketing of poultry products, where they can leverage their social and communication skills, which are often emphasized in female roles (Doss, 2018). The result mirrors that of Sarpong (2017) who reported that poultry farmers are predominantly male (74%). Thus, men dominate poultry production due to the physical demands and the perceived economic importance of these activities, while women are more involved in post-harvest processes and marketing.

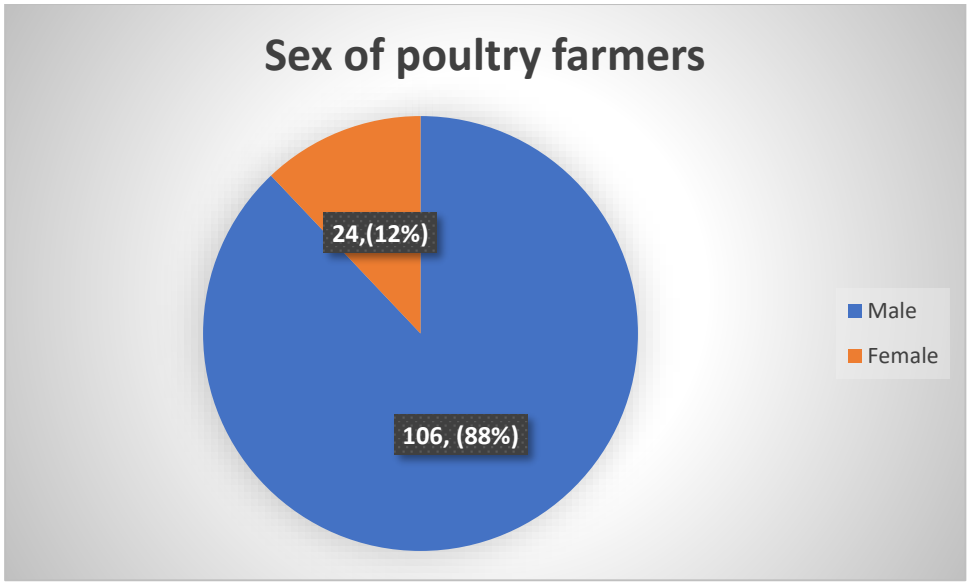

Figure 3: Sex Distribution of Poultry Farmers in the Study Area

Source: Abdoni (2021)

Marital Status of the Farmers

Figure 4 shows the marital status of the poultry farmers. Sixty-eight percent of the respondents, representing 79 farmers, were married. Labour is important for poultry production regarding feeding, cleaning, sanitation, and record keeping. Married farmers, who typically have larger households, are more likely to rely on their children and spouses to help with farming activities. Thus, the dependence on spouses and children for different poultry farm activities not only decreases labour expenses but also improves the overall effectiveness and output of the farm (Doss, 2018).

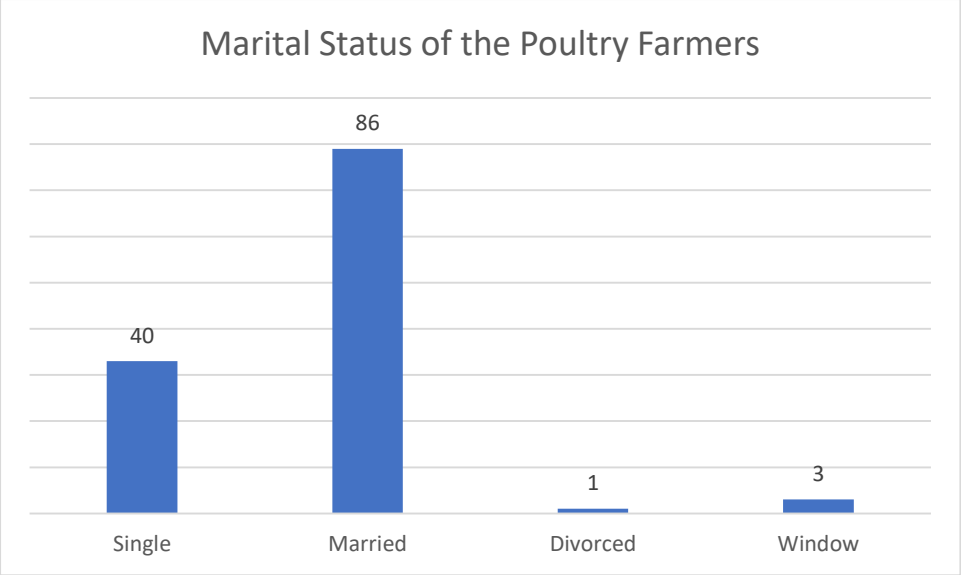

Figure 4: Marital Status of Poultry Farmers

Source: Abdoni (2021)

The Formal Education Level of the Farmers

Figure 5 presents the level of education of the farmers. The finding shows that 97 percent of the farmers have had some form of formal education while the minority (3%) have had no formal education. Farmers with formal education are therefore expected to read and write and are thus able to adopt new agricultural technologies to increase the productivity of farms. According to Suvedi, Ghimire, and Kaplowitz (2017), formal education increases the chance of adopting technologies as people can read about technologies and utilize them in their daily activities. The study findings on the level of education mirror that of Adams et al. (2022) who reported that less than 11 percent of poultry farmers have had no formal education while greater than 89 percent of the farmers had some form of formal education in a study that looked at commercial poultry production in Ghana.

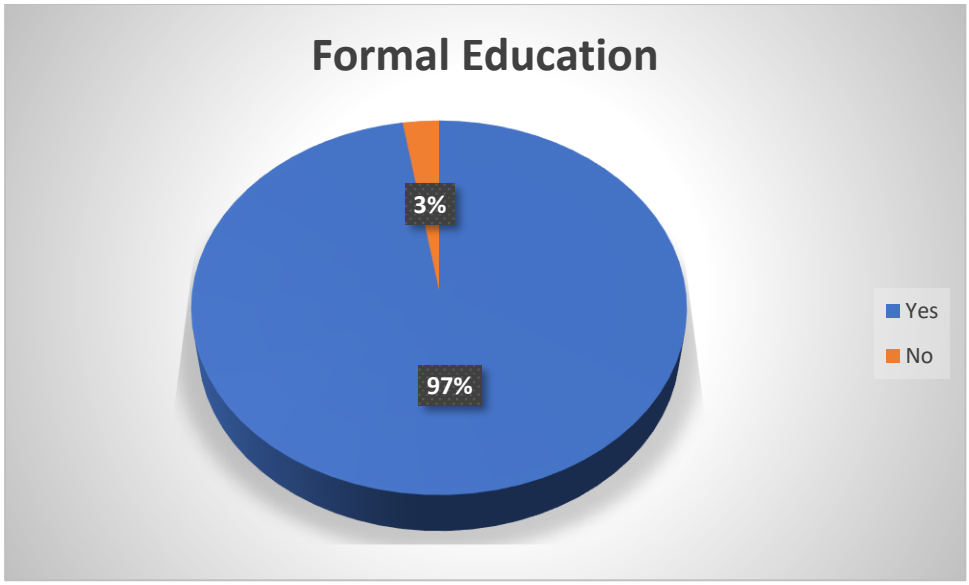

Figure 5: Formal Education

Source: Abdoni (2021)

The Level of Formal Education of the Poultry Farmers

The level of formal education of the farmers is depicted in Figure 6 which indicates that more than 50 percent of the farmers (71) had a tertiary level of education. Very few (3%) of the respondents are primary school graduates whilst almost one out of five had received a Junior High School education. One out of four (25%) farmers responded to have completed either Senior High School, Vocational, and Technical level of education. The result is similar to Sarpong (2017) who pointed out that 56 percent of poultry farmers had an advanced form of education. Poultry farmers with higher education equip them with the knowledge and skills necessary to implement better management practices, utilize modern technologies, and make informed decisions about their farming operations. Educated farmers are more likely to access and comprehend scientific information, which can lead to higher productivity and efficiency in performing farming practices (Šūmane et al., 2018).

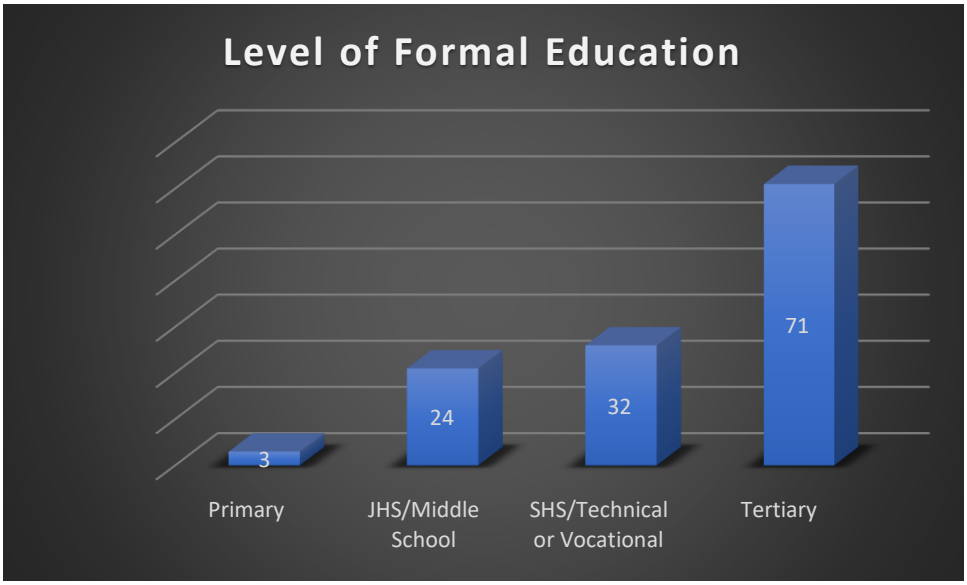

Figure 6: Level of Formal Education of Farmers

Source: Abdoni (2021)

The Age of the Farmers

Table 5 presents information on the age distribution of farmers. The results revealed that 50 percent of the farmers were 40 years or younger. The average age of the farmer was 40 years. Again, the minimum age of the farmer was 19 while the maximum age was 65. The finding represents a good mix of the adult and the youth in the poultry industry which is good since the adults can serve as mentors and role models for young people joining the poultry sector and pass on important knowledge and best practices. Demographic diversity can greatly benefit the sector, as it combines the experience and wisdom of older adults with the innovation and energy of the younger generation. This synergy can enhance productivity, sustainability, and the overall development of the poultry industry (Héroux, S., & Fortin, 2017). The findings of the study are in line with Vaarst et al. (2015) who reported that older adults in the poultry industry often possess extensive practical knowledge and experience. They have

witnessed the evolution of farming practices and have a deep understanding of the challenges and opportunities in poultry production. By serving as mentors and role models, these experienced farmers can guide the youth, helping them avoid common pitfalls and adopt best practices. This mentorship can be instrumental in improving the competence and confidence of young poultry farmers.

Table 5: Age of the farmer

Age	Frequency	Percent	Mean	S.D
Less than 20	3	2.3	41.7	9.88
21 – 30	16	12.3		
31 – 40	46	35.4		
41 – 50	49	37.7		
51 – 60	14	10.8		
60 – 65	2	1.5		
Total	**130**	**100.0**	**41.7**	**9.88**

Source: Abdoni (2023)

Household size of the farmer

The household size distribution of the farmer is presented in Table 6. More than (54.6%) of the farmers had one to two household size. Approximately 39 percent of the farmers questioned reported having three to four household members who assist in poultry production. The farmer who had seven members in his household was only one. The household size of the farmer ranges from one to eight with an average of four. The large household size is advantageous since its members may be relied upon for activities at the farm. The reliance on household members for farm labour is a common practice in

many agricultural settings, where family labour plays a significant role in daily operations. This can be crucial for maintaining the productivity and sustainability of poultry operations, especially in small-scale or family-owned farms (Koufie, 2020). Sumo (2015) noted a relationship between the number of household size influences the size of the poultry farm, implying that large households are capable of managing bigger poultry operations. This increased productivity and translated into higher income and improved living standards for the farming family.

Table 6: Household size of the farmer

Household size of the farmer	Frequency	Percent	Mean	S. D
1 – 2	71	54.6	3.8	2.04
3 -4	51	39.2		
5 – 6	7	5.4		
7 – 8	1	.8		
Total	**130**	**100.0**	**3.8**	**2.04**

Source: Abdoni (2021)

Other Sources of Income for the Poultry Farmer

The other source of income for the farmer is presented in Table 7. The other sources of income identified in the study area were crop farming, other livestock, hunting, trading, artisan, and wage labour. The result from the field revealed that the majority of the farmers were engaged in rearing livestock (25%) as other sources of income for their poultry business while the minority of the farmers were also engaged in hunting (6%). More often than not, farmers engage in other sources of income to supplement their household income since agricultural enterprises are mostly seasonal-based. Raising multiple types of

livestock allows farmers to diversify their source of income. Farmers that diversify their livestock enterprises can spread their risk and prevent potential financial losses linked with volatility in the poultry market. Again, crop farming (23%) was the second income activity that most of the farmers were engaged in followed by trading.

Table 7: Enterprise Farmers are Engaged in Addition to Poultry

Items	Frequency	Percentages
Crop farming	51	23.39
Rearing Livestock	55	25.23
Trading	29	13.30
Hunting	13	5.96
Wage labour	23	10.55
Artisans	24	11.01
Tailoring	23	10.55
Total		100.00

Source: Abdoni (2023)

Type of Land Ownership

A greater percentage of the farmers (88.6%) used their land for poultry production (Figure 7). Few farmers (2%) co-owned their land used in poultry production whilst less than 1 out of 10 of the farmers rented land for poultry production. The findings from the study show that a greater part of the farmers use their land for poultry production. Owning land provides poultry farmers with a sense of security and stability, which is crucial for long-term investments in poultry infrastructure and improvements. Land ownership eliminates the risk of eviction or the sudden loss of access to the land, enabling farmers to invest

confidently in better housing for poultry, advanced feeding systems, and other critical infrastructure (Holden & Ghebru, 2016). The findings of the study resonate with that of Place (2009) who asserted that land ownership positively influences agricultural productivity by encouraging farmers to make long-term investments

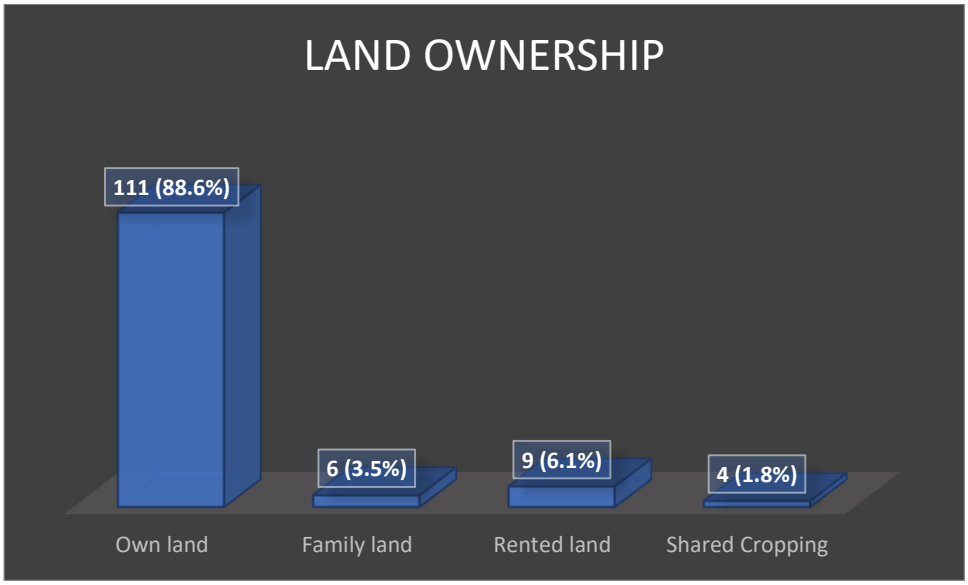

Figure 7: Land Ownership

Source: Abdoni (2023)

Sources of Financing Poultry Production

The starting costs, purchasing of equipment, and managing day-to-day expenses are critical for efficient poultry production. Figure 8 shows that a greater number of the farmers (74.5%) financed poultry farms from their resources while a few (5.4%) assessed loans to finance production. This is not surprising as farmers are also engaged in other works to generate finance. Again, 16.2 percent finance poultry production from family and friends. This implies that poultry production in the study area is mostly self-financing. Interaction with the farmers revealed that most banks are not willing to provide loans to farmers because of the risk and uncertainty associated with poultry

production. The results align with those of Omari (2020), who determined that a significant majority (61.7%) of farmers fund their farms using their financial resources. The lack of collateral security to secure loans from financial institutions was the main reason for that study. Ametepey (2020) also found that nearly three-fourths of the farming activity is self-financed.

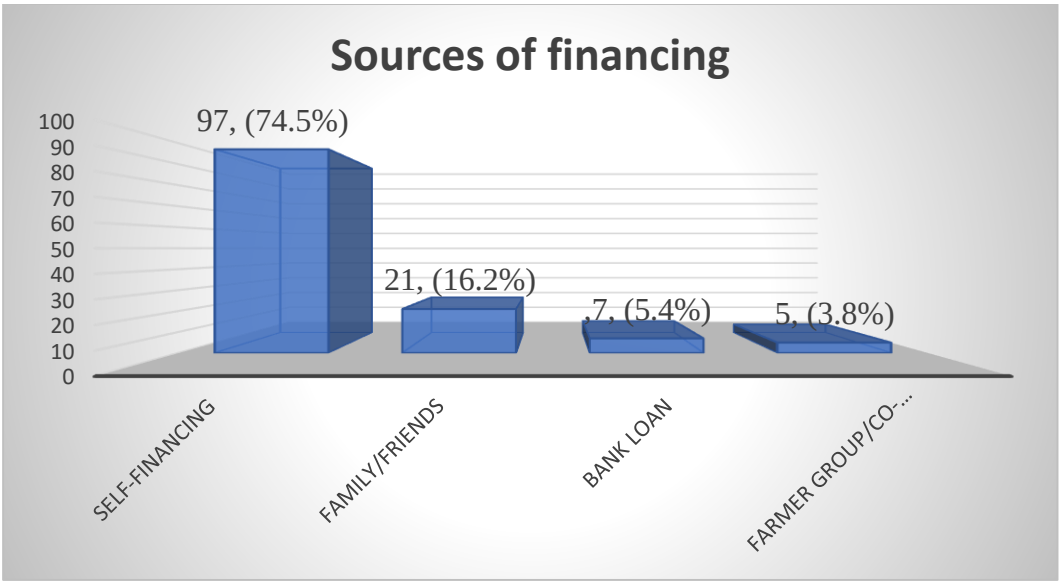

Figure 8: Sources of Financing

Source: Abdoni (2021)

Source of Labour for poultry farming

The data presented in Table 8 reveals that the majority of the labour force in poultry production comes from family labour, which accounts for 57.0% of the total workforce. Rented labour makes up the remaining 43.0% of the workforce. Family labour is the most significant source of labour for poultry production, making up more than half of the total workforce in the study area. This result is consistent with the nature of poultry production, which is often a family-owned and operated business. Family members can provide a reliable, dedicated, and cost-effective labour force for poultry production (Sarpong, 2017). Similarly, Gonzalez-Garcia (2015) reported that family members often

play integral roles in poultry farming operations, contributing to various tasks such as feeding, cleaning, egg collection, and even management decisions. This involvement helps in reducing labour costs and ensures continuity in farm operations.

Table 8: Source of Labour

Source of labour	Frequency	Percentage
Family labour	74	57.0
Rented labour	56	43.0

Source: Abdoni (2021)

Training on poultry production

Figure 8 presents the results of formal training received by the farmers. The majority (58%) of the farmers had no formal training in poultry production while 42 percent have had formal training in terms of poultry production. Formal training provides farmers with essential knowledge of best practices, disease management, nutrition, and breeding techniques, which are critical for improving efficiency and profitability (Tijani, 2019). However, the majority of the farmers without any formal training in poultry production underscores a potential gap in knowledge and skills that could affect productivity and sustainability in poultry production in the study area.

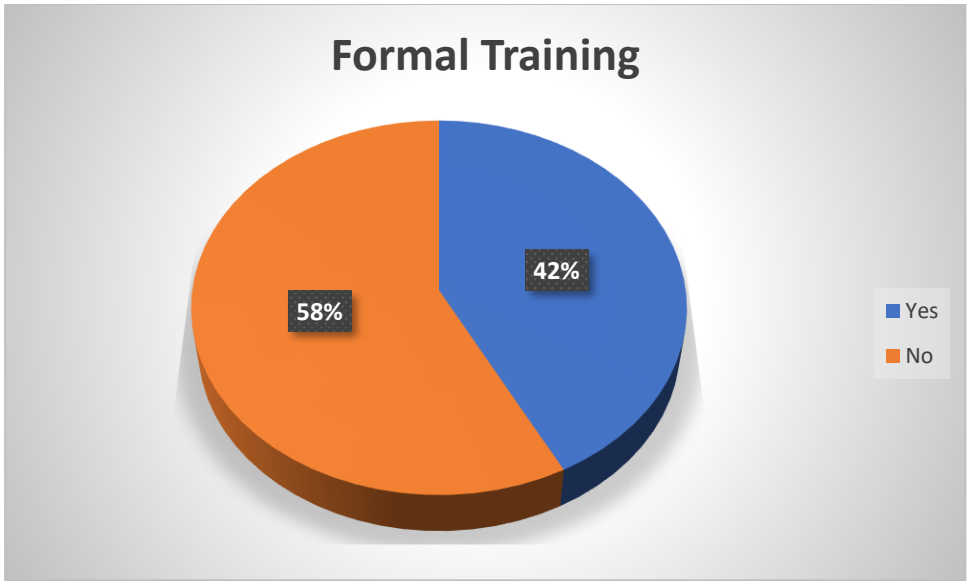

Figure 9: Formal Training

Source: Abdoni (2021)

Farm-Based Organization of Poultry Farmers

Figure 9 revealed that only 37 percent of the poultry farmers were members of farm-based organizations while 63 percent of the poultry farmers did not belonged to any farm-based organizations. The absence of participation among the majority of farmers implies that many may be foregoing these advantages, thereby impeding their productivity and competency level. The findings of the study are at variance with Sarpong (2017) who pointed out that more than 55 percent of the poultry farmers were in farm-based organizations when examining factors influencing the performance of small and medium-scale enterprises in Dormaa. The differences in the findings of the study may be attributed to the different regions or under different geographic conditions compared to Sarpong's study. Regional variations in the organization and support for farm-based groups could lead to differences in membership rates.

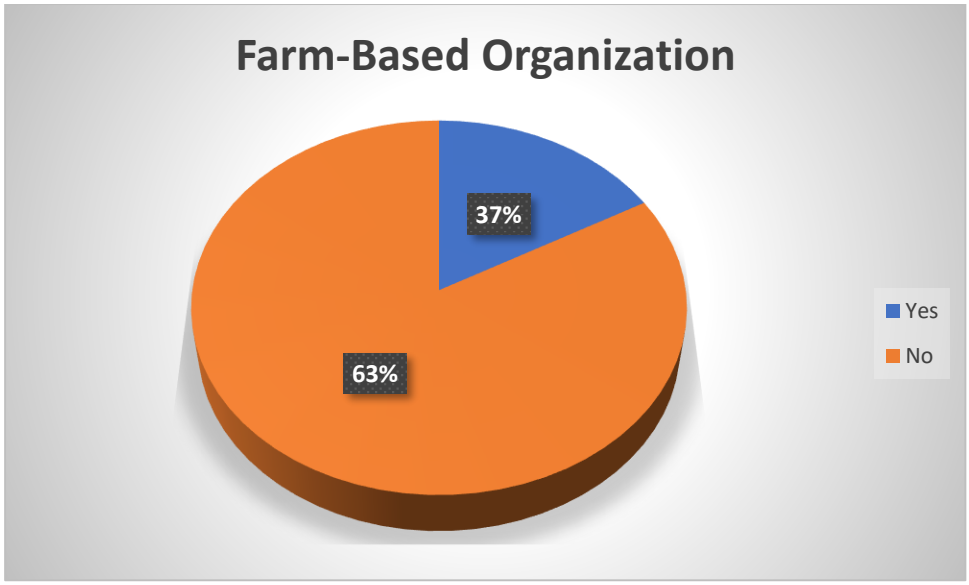

Figure 10: Farm-Based Organization

Source: Abdoni (2021)

Socioeconomic Characteristics of AEAs

Sex of AEAs

The sex distribution of AEAs is presented in Figure 10. The distribution shows that male (70%) AEAs were dominant over females (30%). This disparity is indicative of wider patterns in the agricultural industry and the field of agricultural extension services, whereby males are more likely to hold positions that include fieldwork, technical expertise, and direct engagement with farmers. The working conditions for AEAs, which often include extensive travel and fieldwork in remote areas, can be less appealing for women, especially those with family responsibilities (Quisumbing, Behram, & Nkonya, 2018). The findings conform to Akpotosu et al. (2017) who examined the determinants of agricultural extension agents network competencies in the Eastern Region of Ghana and found that male AEAs dominate females.

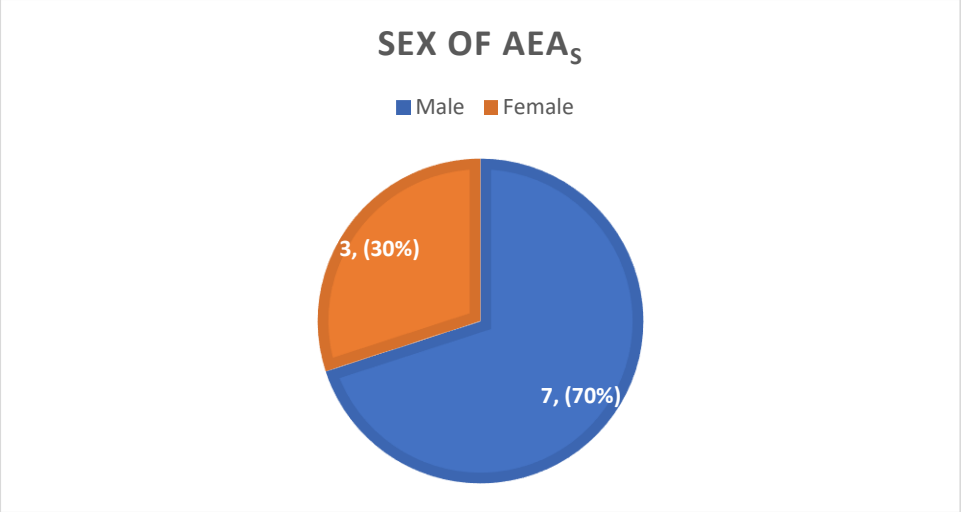

Figure 11: Sex of AEAs

Source: Abdoni (2021)

The Educational Background of AEAs

Figure 11 shows the educational background of the AEAs. The results show that the AEAs were highly educated. Six out of ten AEAs had a Bachelor of Science in Agriculture and a master's level of education. Two each were diploma or certificate holders. Education enhances access to reliable information and equips individuals with the ability to understand concepts and technology effectively. Furthermore, education helps extension agents make the appropriate decisions to implement new technologies with poultry producers. (AI-Zahrani et al., 2016). By implication, AEAs with higher levels of education will be able to adopt new technologies such as automated feeding systems, environmental control systems, and genomic selection and breeding to help farmers improve their productivity.

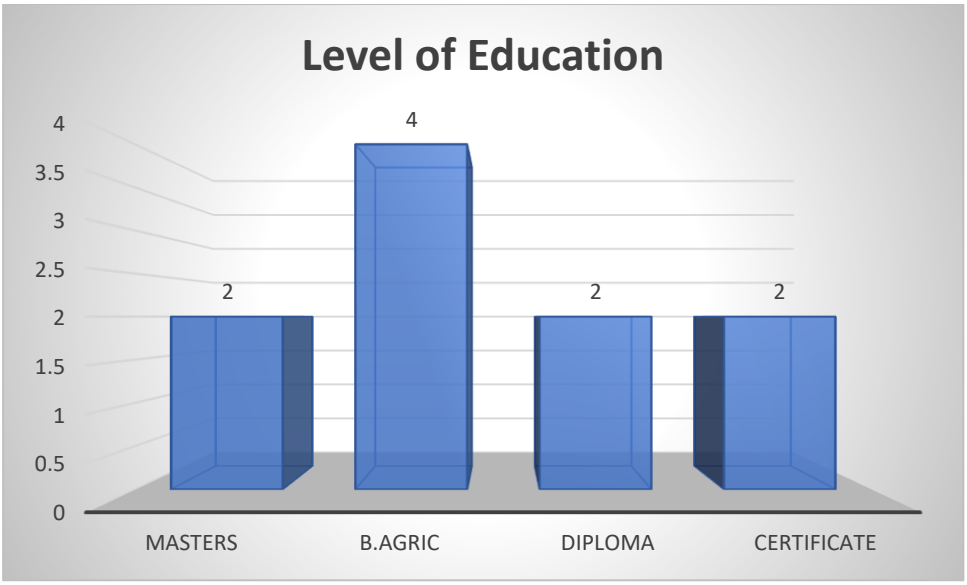

Figure 12: Level of Education

Source: Abdoni (2021)

Age of AEAs

The age distribution of the AEAs is presented in Table 9. The result shows that 40 percent of the AEAs were 40 years and below while 60 percent of the AEAs were 41 years and above. The average age of the AEAs was 42 years. The ages of the AEAs ranged from a minimum of 28 to a maximum of 59 years. This age range suggests that AEAs are likely to demonstrate maturity, professionalism, and confidence, contributing to their credibility among farmers and other stakeholders. Life experiences, communication skills, and problem-solving talents empower them to negotiate complex agricultural concerns and develop meaningful partnerships with farmers (Kilelu et al., 2017). The findings concur with Khan et al. (2019) who asserted that mature AEAs are more likely to possess the skills necessary to communicate complex agricultural information effectively and to implement programs that require careful planning and execution.

Table 9: Age Distribution of the AEAs

Age	Frequency	Percent	Mean	S. D
20 – 30	3	30	42.10	11.377
31 – 40	1	10		
41 – 50	4	40		
51 – 60	2	20		
Total	**10**	**100**	**42.10**	**11.377**

Source: Abdoni (2021)

Level of Experience of AEAs

The findings on years of experience indicate that less than 20 percent of the AEAs had one to ten years of experience, while 80 percent of the AEAs had 11 years or more of experience (Table 10). The minimum level of experience was 4 years, while the maximum level of experience was 34 years. The mean level of experience of the AEAs was 18 years. AEAs with substantial poultry farming experience are likely to have a thorough understanding of all various aspects of poultry production, management, and health. Throughout their years of service, they have encountered a wide range of issues, best practices, and innovations, allowing them to provide useful insights and advice to farmers. These AEAs will help farmers to improve their poultry husbandry management practices to increase productivity. Similarly, Sattar et al. (2022) pointed out that experienced AEAs have developed practical abilities in poultry farming via hands-on training and exposure to real-world scenarios. They are knowledgeable in poultry house management, feed formulation, disease management, breeding procedures, and market linkage tactics, all of which they can share with farmers to help them improve their operations.

Table 10: Level of Experience Distribution of the AEAs

Experience	Frequency	Percent	Mean	S. D
1 – 10	2	20	17.80	9.920
11 – 20	6	60		
21 and above	2	20		
Total	**10**	**100**	17.80	9.920

Source: Abdoni (2021)

Position as Extension Officer/AEAs

Figure 12 shows the job position of the AEAs. Out of the 10 AEAs interviewed 2 were supervisors while 8 were field officers who had direct contact with the poultry farmers. Field officers are typically the frontline workers in agricultural extension. They have direct contact with farmers, providing hands-on assistance, education, and support. According to Firmanto et al. (2023), field officers interact directly with farmers regularly, visiting most farmers' towns, fields, and homes. Field officers can build strong relationships, trust, and rapport with farmers, which are crucial for ensuring that farmers' needs, challenges, and goals are effectively addressed.

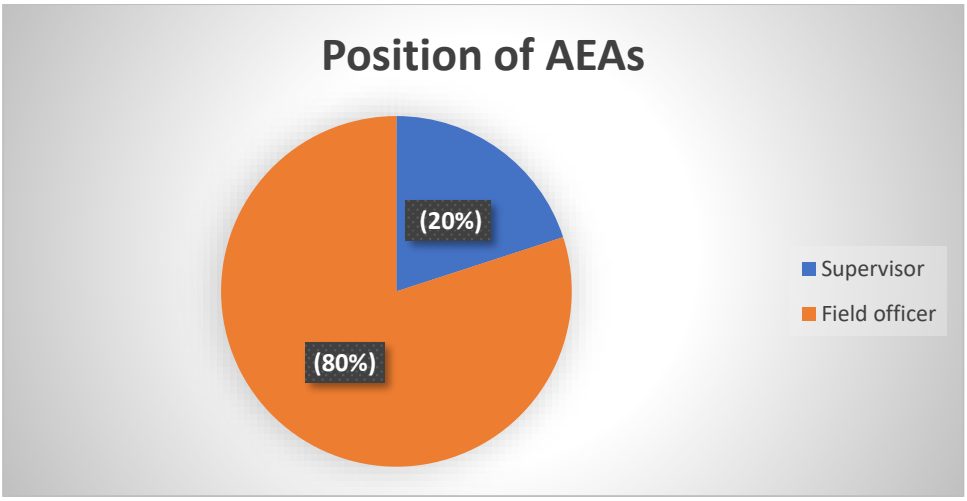

Figure 13: Job Position of AEAs

Source: Abdoni (2021)

Trainings Attended by AEAs

Training enables AEAs to anticipate the potential challenges that may emerge from the use of new technologies in poultry production and management. During the field exercise, it was discovered that all the AEAs have some level of training in poultry husbandry management. The study further assessed the number of times the AEAs had received training. Table 11 indicates that out of the 10 AEAs, 7 have participated in training once, while one of the AEAs had attended training twice. Two of the ten AEAs have participated in training on three occasions. The research findings show that while all AEAs received some form of training, the frequency of these training sessions was insufficient. Similarly, Ametepey (2020) found that most AEAs who received training less than five times incur difficulties in communicating innovations and information effectively to farmers.

Table 11: Number of Training Attended by AEAs

Number of training attended	Frequency	Percent
1	7	70.0
2	1	10.0
3	2	20.0
Total	**10**	**100.0**

Source: Abdoni (2021)

Nature of Poultry Production

The Type of poultry Production System

Housing is essential while raising layer poultry on a commercial and small-scale basis. The type of production system in poultry farming is critical because it influences factors such as the environment of birds, animal welfare, resource use, and management practice. According to Englmaierova et al. (2014), the housing structure of birds affects the health and the quality of egg production. Table 12 presents result on the structure of poultry production in the study area. The majority of the farmers representing 73.8 percent were into deep litter production structures while 15.4 percent were using battery cage production structures. This is not surprising because the deep litter system increases animal welfare, health, and hygiene of birds. It is also cost-effective and environmentally sustainable (Yensuk, 2019). According to Adams (2017), the deep litter system of production increases production compared to the battery cage production system

Table 12: Structure for poultry production

Housing Structure	Frequency	Percent (Rank)
Battery cage	20	15.4
Deep litter system	96	73.8
Floor	14	10.8
Total	**130**	**100.0**
Other Structure		
Breeder Farms	83	61.03
Hatchery	21	15.44
Feed Mill	32	23.53
Total		**100.0**

Source: Abdoni (2021)

Furthermore, based on the other structures used on the farm, it was discovered that the majority of the farmers representing 61 percent had breeder farm structures. More than one-fifth had feed mills to produce their feed whilst 15 percent possessed hatcheries to produce their day-old- chicks.

Observation of the breeder farms showed that they were equipped with advanced biosecurity measures to prevent the spread of disease. Therefore, obtaining birds from controlled environments can help minimize the risk of disease outbreaks that could potentially devastate poultry populations (Wong et al. 2019). Nkukwana (2018) has written extensively on the economic benefits of using breeder farms such as lowering mortality rates and ensuring higher productivity and high returns on investment for poultry farmers. Most farmers' feed mills were not operational due to the high cost and scarcity of raw materials like maize, fishmeal, and vitamins, compounded by the expensive labour

required for feed production. Additionally, hatcheries primarily focused on producing cockerels for local bird production.

The Source of Day-Old Chicks

The majority of the farmers (86%) import their day-old chicks from external sources according to Figure 13. Only 14 percent of the farmers depended on local sources for their day-old chicks. According to Narrod et al. (2009), imported day-old chicks are frequently preferred since they are perceived to have higher quality and dependability compared to chicks purchased locally. Imported chicks are often derived from established genetic lineages that guarantee better development rates, disease resistance, and production. The reason for the low demand for day-old chicks as expressed by farmers conforms to observations in developing countries such as inadequate facilities, poor management practices, and lack of access to high-quality breeding stock (FAO, 2010).

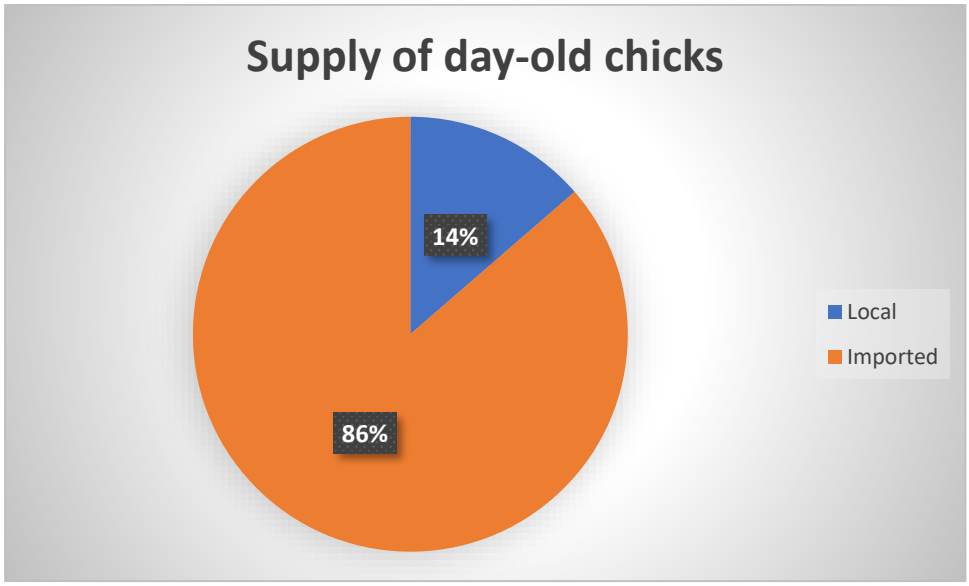

Figure 14: Source of day-old chicks

Source: Abdoni (2021)

Number of Birds Owned by the Farmer.

Table 13 presents the report on the number of birds owned by farmers. The study revealed that out of the 130 farmers, almost 100 of them representing 76.2 percent owned less than 1000 birds. Only a farmer owned more than 4000 birds. Again, the minimum number of birds owned by the farmers was 44 and the maximum number of birds owned was 4050. The mean number of birds owned by farmers is 362. The disparity in the number of birds kept could be attributed to poor access to various poultry production inputs. Nkukwana (2018) pointed out that the availability of land, manpower, capital, and inputs influences the size of a poultry farm. Farmers that have access to plenty of space and water resources extend operations and acquire additional birds. Adequate personnel for performing activities such as feeding, watering, cleaning, and monitoring can boost the productivity of birds. Follitse et al. (2018) revealed that the average number of birds owned by the farmer was 252 when examining poultry farmers' information needs and sources in selected rural communities in Greater Accra, Ghana. The differences in the findings can be attributed to the location of the various studies. The location of the poultry farm determines the availability of farm input that will aid in production.

Table 13: Number of Birds owned by the farmer

Number of Birds	**Frequency**		**Percent**	
Below 1000	99		76.2	
1000 – 2000	23		17.7	
2001 – 3000	5		3.8	
3001 – 4000	2		1.5	
Above 4000	1		0.8	
Total	**130**		**100.0**	
Item	**Min.**	**Max.**	**Mean**	**St. Deviation**
Number of birds owned	44	4050.00	362.1364	159.15184

Source: Abdoni, (2021)

Sources of Day-Old Chicks

The results presented in Table 14 indicate that a higher proportion of farmers (86%) rely on day-old chicks imported from abroad for production. These birds are primarily destined for European countries such as Belgium and the Netherlands. Few of the farmers (14%) depend on the hatcheries in Accra and Kumasi for day-old chicks. The results imply that day-old chicks for poultry production are foreign-dependent. The main reason assigned for this phenomenon is that local sources of day-old chicks are inconsistent in supply, and the quality is below average, thus making it difficult for farmers to rely solely on them for their stock. The reliability of local hatcheries is a significant issue with many small-scale operations (McDermott et al. 2010). On the other hand, the quality control measures in international hatcheries are generally more stringent, ensuring that the chicks are of superior quality, thereby assuring a constant supply (Wambugu, 2019).

Table 14: Sources of day-old chicks

Source	Frequency	Percentage
Accra-Kumasi	18	14
Europe (Holland, Belgium, Sweden)	108	83.00
Ivory Coast	4	3
Total	**130**	**100**

Source: Abdoni (2021)

Perceived Poultry Husbandry Management Competencies of Farmers

The results presented in Table 15 revealed that the farmers perceived the poultry management practice variables to be highly important in estimating their competencies (Mean =5). The Mean Weighted Discrepancy Score (MWDS) shows that farmers perceived themselves as having higher competence in determining appropriate sources of healthy birds (MWSD = 1.2), sanitation (MWSD = 1.6), identification of the various poultry diseases (MWSD = 1.65), and Selection of appropriate structure type for birds (MWSD = 1.75). The farmers also possess a moderate competence in health management (MWSD =2.1), breeding and genetics (MWSD = 2.05, and provision of lighting for birds (MWSD = 2.3). The findings demonstrate that the farmers possess higher competencies in identifying and securing healthy birds, which are fundamental for successful poultry farming. Healthy chicks are essential for maintaining a productive flock and minimizing disease outbreaks. According to USDA (2018), selecting high-quality day-old chicks from reputable suppliers is a critical step in poultry management, as it sets the foundation for the bird's overall health and productivity. Again, proper sanitation practices are vital in preventing disease spread and ensuring a clean environment for poultry. Adequate sanitation measures include regular cleaning and disinfection of housing, equipment, and surrounding areas. The findings of the study mirror that of Fairchild et al. (2009), who emphasized the importance of maintaining strict biosecurity and sanitation protocols to reduce the risk of infections and improve overall bird health.

However, the findings also reported that the farmers possess low competency in periods of vaccination (MWSD = 12.3) and periods of

disinfestation (MWSD = 12.3). Periods of vaccination and disinfestation were discovered with the highest MWDS, suggesting significant gaps in knowledge and practices that require immediate attention and training. Vaccination is a critical component of poultry health management, aimed at preventing infectious diseases that can severely impact poultry productivity. The low competency in this area highlights a significant gap in farmers' knowledge and practices. Prank et al. (2024) asserted that proper vaccination schedules are essential for preventing outbreaks of diseases such as Newcastle disease, avian influenza, and Marek's disease. Inadequate knowledge about vaccination periods can lead to missed or improperly timed vaccinations, resulting in vulnerable birds and increased mortality rates. Again, disinfestation involves the removal of external parasites such as mites, lice, and ticks that can affect poultry health and performance. The limited competence in this area indicates that farmers may not be effectively managing parasite infestations, potentially resulting in reduced productivity and a higher risk of disease transmission. According to Fraser et al. (2010), regular disinfection practices are crucial for maintaining a healthy poultry environment, as parasites can cause significant stress and health issues in poultry production. Addressing the significant knowledge gaps regarding vaccination and disinfestation periods is critical for improving the overall health and productivity of poultry farms. By implementing targeted training programs, enhancing extension services, and utilizing technology, farmers can be better equipped to manage their flocks effectively. This will not only reduce mortality rates and disease outbreaks but also contribute to the sustainability and profitability of poultry farming.

Table 15: Level of competency in poultry management practice among the farmers using Borich competency needs assessment

Poultry management practice	Importance		Competence		Difference	MWSD	Rank
	Mean	S. D	Mean	SD			
Selection of type of birds	5.00	-	4.63	0.61	0.37	1.85	17th
Determining appropriate sources of healthy birds.	5.00	-	4.76	0.65	0.24	1.20	21st
Selection of appropriate structure type for birds	5.00	-	4.65	0.68	0.35	1.75	18th
Breeding and genetic	5.00	-	4.58	0.69	0.42	2.10	14th
Health management	5.00	-	4.59	0.67	0.41	2.05	15th
Biosecurity	5.00	-	*3.18*	1.09	1.82	9.12	3rd
Handling of day-old chicks	5.00	-	4.63	0.60	0.37	1.85	17th
Egg production	5.00	-	4.40	1.01	0.6	3.00	7th
Meat production	5.00	-	4.62	0.67	0.38	1.90	16th
Provision of lighting for birds	5.00	-	4.54	0.64	0.46	2.30	12th
Formulation of poultry feed.	5.00	-	4.41	1.06	0.59	2.95	9th
Housing	5.00	-	4.40	0.95	0.6	3.00	7th
Managing a commercial poultry pen	5.00	-	4.47	0.81	0.53	2.65	10th
Identification of the various poultry diseases	5.00	-	4.67	0.73	0.33	1.65	19th
Waste management	5.00	-	4.53	0.66	0.47	2.35	11th
Litter management	5.00	-	*3.47*	0.83	1.53	7.65	4th
Periods of vaccination	5.00	-	2.54	0.73	2.46	12.3	1st
Sanitation	5.00	-	4.68	0.64	0.32	1.60	20th
Transportation of chicks	5.00	-	*3.57*	0.80	1.43	7.15	5th
Periods of disinfestation	5.00	-	2.60	0.75	2.4	12.0	2nd
Practices before stocking your day-old chicks	5.00	-	*3.66*	0.73	1.34	6.70	6th
Composite	5.00	-	**4.55**	**0.76**	**17.87**	**89.35**	

Source: Abdoni, (2021). The means were calculated from a scale of 1 = Very low, 2 = Low, 3 = Moderate, 4 =High and 5=Very High

The relationship between the socio-background and level of competencies of poultry farmers

The results in Table 16 demonstrated the relationship between background characteristics and the level of competencies in poultry management practices among poultry farmers. According to Rhaffor and Jamian (2020), the strength of correlation analysis depends on the coefficients. Thus, 0.70 to 1.00 is very strong, 0.50 to 0.69 substantial, 0.30 to 0.49 moderate, 0.10 to 0.29 low, and 0.01 to 0.09 negligible correction. There was no significant relation between sex ($r=0.120$, $p<0.211$), marital status ($r=-0.$ -0.081, $p<0.$ 422), formal education ($r=0.291$, $p<0.208$), and ownership of farm ($r=0.017$, $p<0.856$) and farmers' poultry management practices.

However, significant and positive relationships were found between the number of training sessions attended ($r=0.500$, $p<0.000$) and competency in farmers' poultry management practices. The association implies that farmers who engage in additional training sessions exhibit a higher degree of competence and poultry management practices, which is crucial for the profitability and long-term viability of poultry farming operations. The findings of the study affirmed that of Sarpong (2017) who reported that farmers who attend various training programs are critical for maintaining high standards in poultry production, especially in areas prone to frequent changes in disease dynamics and market conditions.

The study results show a positive and significant correlation between access to extension services ($r=.$ 0.406, $p<0.030$) and competency. The correlation indicates that farmers with increased access to extension services exhibit greater

competence in poultry management. Extension agents operate as intermediaries between research and practical application. They help farmers by spreading scientific results and creative approaches, which may greatly enhance farm management. Similarly, Franz et al. (2010) pinpointed that extension agents who are well-trained in poultry management are more effective in educating farmers, thereby enhancing farmers' competencies.

The age ($r=0.249$, $p<0.045$) of the farmer has a positive correlation with the competency of poultry production. This suggests that as farmers grow older, their proficiency in poultry management practices tends to improve. The association may be ascribed to several factors, including the accumulation of experience, increasing exposure to training opportunities over time, and heightened responsibility. The findings mimic that of Franz et al. (2010) who revealed that continuous education and training extension services significantly enhance farmers' competencies in various poultry farming.

Again, the experience of the farmer ($r=0.558$, $p<0.000$) had a positive relationship with the competency level of the farmers. This suggests that more experienced farmers are likely to have a higher competency level in poultry management. Having experience in farming offers several benefits that enhance one's degree of competence. Seasoned agriculturalists often possess an in-depth understanding of the nuances of poultry management, acquired through extensive practical experience and the assimilation of knowledge from both successes and failures. Through experience learning, individuals can acquire practical skills that are essential for successful poultry production, including the ability to identify

diseases, implement appropriate feeding techniques, and efficiently run the farm. Likewise, Mtega and Msungu (2013) reported that experienced farmers tend to adopt and effectively implement improved agricultural practices more readily than less experienced farmers.

The was a substantial and positive relationship between farm household size ($r=0.598$, $p<0.000$) and the competency level of the farmer. This implies that large farm households contribute to higher competency levels in poultry production. Larger farm households typically have more members available to contribute to farm activities, which can significantly enhance productivity and management efficiency. The presence of multiple household members can distribute the workload, making it easier to maintain high standards of poultry care and management. The findings affirmed the findings of Sumo (2015) who discovered a significant relationship between household size and farm productivity, as large households can provide more labour for agricultural activities. This is particularly important in poultry production, where tasks can be labour-intensive and require consistent attention.

Table 16: Relationship between competence level and demographic characteristics

Independent Variable	Correlation Coefficient(r)	p-value	Strength of correlation	Type of correlation
Sex	0.120	0.211	Negligible	Biserial
Marital Status	-0.081	0.422	Negligible	Biserial
Formal Education	0.291	0.201	Low	Biserial
Number of Training	0.500*	0.000	Substantial	Pearson
Extension	0.142*	0.030	Negligible	Biserial
Membership of FBO	0.406*	0.001	Moderate	Biserial
Ownership of Farm	-0.117	0.876	Negligible	Biserial
Age	0.249	0.045	Low	Pearson
Number of years of Experience	0.558*	0.003	Substantial	Pearson
Household size	0.598*	0.008	Substantial	Pearson

**.p<0.01, * p<0.05
Source: Abdoni (2021)

Factors Influencing the Competency of the Poultry Farmer

The results presented in Table 17 show the factors influencing the competency of the farmers. The results summary includes several key metrics that help explain the factors affecting the competency of poultry farmers. These metrics include the R-squared value, the adjusted R-squared value, the R-squared change, and the F-statistic. The R-squared value is 0.564, which means that approximately 56.4% of the variance in poultry farmer competency is explained by the independent variables included in the model. This suggests a strong relationship

between the independent variables and the competency levels. An Adjusted R^2 of 0.552 indicates that, after adjusting for the number of predictors, 55.2% of the variability in the competency levels is explained by the model. An F value of 38.949 indicates that the model is statistically significant. The high F value suggests that the independent variables collectively provide a good fit for the data and have a significant influence on the competency levels of poultry farmers. An R^2 Change of 0.021 indicates that adding these predictors to the model increased the explanatory power by 2.1 percent. This suggests that the additional factors included in the model have a small but noticeable impact on explaining the variability in competency levels.

Table 17: The factors influencing the level of competency of the farmer using Stepwise regression.

Variables	Beta	S. E.	R Square	Adjusted R2	R2 change	F. Reg	P-value
Constant	3.822*	0458	0.564	0.552	0.021	38.949	0.000
Household of size	0.492*	0.031					
Extension	0.357*	0.141					
FBO	0.550*	0.209					
Number of Training	0.181*	0.070					
Experience	0.347*	0.166					

Source: Field Survey, Abdoni (2023) *p<0.05

Farm households with more members were found to be 0.492 times more likely to increase their level of competence in poultry production. More people are usually available to participate in agricultural operations in larger families. By dividing up the work, more people may share chores like feeding, cleaning, sanitation, and record-keeping, which can increase productivity and efficiency. The results are similar to that of Sumo (2015) who revealed a positive relationship between household size and farm size, suggesting that large households can manage more extensive farming operations due to the availability of labour.

Farmers with access to extension services were found to be 0.357 times more likely to see their competency levels improve in poultry farming. This finding highlights the crucial role that extension services play in enhancing the skills and knowledge of farmers. Farmers may get up-to-date information on new technology, research results, and best practices in poultry farming via extension services. This continuous flow of information helps farmers stay updated and adopt innovative techniques that can improve their competency. The findings of the study corroborate with Mmerife et al. (2023) who noted that extension agents are instrumental in disseminating knowledge and promoting the adoption of improved farming practices.

Poultry farmers who are members of farm-based organizations have a 0.550 times higher chance of improving their competency compared to those who are not members. Members of farm-based groups often exchange resources and information with one another. This common knowledge base may assist farmers in implementing improved procedures and enhancing their competence in raising

poultry. The findings of the study mirror that of Spielman, Ekboir, and Davis (2009) who stated that farmers' organizations serve as platforms for sharing agricultural innovations and knowledge, which significantly contributes to the professional development of their members.

In the area of formal training, it was found that farmers with some form of formal education were 0.181 times more likely to demonstrate a higher level of competency in poultry production compared to those without any formal training. Farmers are often introduced to cutting-edge methods and best practices in poultry production via formal training. Farmers may increase output, lower losses, and improve the general welfare and health of their poultry by using these measures. Similarly, Hailu et al. (2020) reported that farmers with access to formal training in line with their economic activity are likely to exhibit a higher level of competency.

The analysis reveals a significant positive relationship (0.347) between the years of experience a poultry farmer had and their competency level. This suggests that the longer farmers engage in poultry farming, the more competent they become. Over time, farmers accumulate vital practical knowledge, enabling them to improve their methods, comprehend the complexities of poultry management, and devise successful plans to increase output. Similarly, Lapple (2010) states that farmers with much poultry farming experience have enough knowledge and skills to make informed decisions. Ametepey (2020), confirmed that the more farming experience a farmer has, the greater their competencies and capacity to make significant decisions to increase production.

Challenges Faced by Poultry Farmers

Kendall's concordance coefficient (W) was used to estimate the challenges faced by the farmers. Based on the model summary, Kendall's W (0.121) indicates a positive association between the ranking of challenges and the perceived importance of those challenges. The Chi-Square value of 286.240 indicates that the null hypothesis is rejected, implying that there is significant agreement among the respondents about the ranking of challenges. The asymptotic significant value of 0.000 means that the observed agreement is highly significant statistically. This suggests that the rankings provided by the respondents are not due to random chance.

The results from Table 18 show that the poor quality of day-old chicks (Mean = 8.25) and disease outbreaks (Mean = 8.25) were the most significant challenges encountered by poultry farmers in their production efforts. However, high trade liberalization was noted to be the least limiting constraint to the farmers with a mean rank of 12.40 followed by the high cost of feed being the second least limiting constraint with a mean rank of 12.96. Kendall's W used to analyze the degree of agreement between the ranks shows that 12.1 percent of poultry farmers agree that the inadequate quality of day-old chicks and disease outbreaks were the most limiting challenges faced by poultry farmers. The quality of day-old chicks has a direct influence on the bird's genetic potential and future performance. Chicks with poor genetics such as low growth rate, inferior meat quality, or susceptibility to diseases, are likely to reduce the overall productivity and profitability of poultry farming operations (Pawlowska & Sonsnowka-Czaika, 2019). The study further

assessed the challenges faced by poultry farmers under input, production, marketing, and policy constraints.

Table 18: Challenges Faced by the Farmers

Variables	Mean Rank	Ranking
inadequate quality day-old chicks	8.25	1st
Frequent disease outbreak	8.25	1st
High competition from cheap imported chicken	8.57	3rd
Low prices of poultry products	8.88	4th
Inadequate training	8.90	5th
Inadequate capacity building	9.02	6th
Low demand for poultry products	9.03	7th
inadequate infrastructure/processing technology	9.58	8th
Low-quality of compounded feed	9.64	9th
High energy costs and power shortages	9.69	10th
Inadequate access to veterinary services	10.66	11th
High-interest rate	11.04	12th
Inadequate credits facilities	11.21	13th
Unavailability of transport	11.40	14th
Insufficiency of government support or subsidy	12.25	15th
High cost of medication	12.30	16th
Inconsistent government policies	12.41	17th
High cost of day-old chicks	12.57	18th
High cost of feed	12.96	19th
High trade liberalization	13.40	20th
Test Statistics		
Sample Size	130	
Kendall's (W)	0.121	
Chi-Square	286.240	
Degree of Freedom	19	
Asymp. Sig	0.000	
Rank 1= most pressing is inadequate quality day-old chicks		
Rank 5 = Least limiting is High trade liberalization		

Source: Abdoni, (2021)

Inputs constraint

The results from Table 19 indicate that the high cost of feed was the most limiting challenge faced by the poultry farmers in their poultry production with a mean rank of 4.33 and the high cost of medication service was the second most limiting constraint with a mean rank of 4.62. However, lack of quality day-old chicks was noted to be the least limiting constraint to these farmers with a mean rank of 6.67 followed by high energy cost and power shortages being the second least limiting constraint with a mean rank of 6.33. Kendall's W was used to analyze the degree of agreement between the ranks, and it shows that 10.9 percent of the poultry farmers agree with each other that the high cost of feed is the most limiting constraint faced by the poultry farmers followed by the high cost of medication services. Similarly, Adetayo et al. (2013) stated that the high cost of feed was a major impediment to the poultry industry's expansion. Poultry farmers were unable to obtain high-quality feed for their birds due to high costs. Farmers depended on less expensive feed that lacked high-quality ingredients for feed formulation. Farmers who could afford better feed, on the other hand, were unable to keep more birds. There was a trade-off between the quantity of birds and the amount of high-quality diet. Additionally, Adeyemo and Onikoyi (2012) demonstrate that the high cost of bird feed is the biggest challenge faced by Nigerian poultry farmers (much like the situation in Ghana). According to the survey, poultry farmers did not have enough money to buy quality feed for their birds. As a result, they had to rely on cheaper, lower-quality feed. The lower-quality feed is made from raw materials that have been improperly processed and managed. The use of such feed is harmful to

the health of the birds and may increase mortality. Finally, Hagan (2020) highlights the challenges encountered by poultry producers in the Ejisu Municipality, along with their respective rankings. The study reveals that 95% of respondents identified the high cost of feed as the most significant issue faced by poultry breeders in the municipality.

Table 19: Input constraint

Variables	**Mean Rank**	**Ranking**
High cost of feed	4.33	1st
High cost of medication	4.62	2nd
High cost of day-old chicks	6.25	3rd
Unavailability of transport	5.73	4th
High-interest rate	5.50	5th
Inadequate access to credit facilities	5.45	6th
Inadequate access to veterinary services	5.43	7th
Low-quality of compounded feed	4.68	8th
High energy costs and power shortages	6.33	9th
Insufficiency of quality day-old chicks	6.67	10th
Test Statistics		
Sample size (n)	130	
Number of ranked barriers	10	
Degree of freedom	9	
Kendall's W	0.109	
Chi-Square x^2)=	112.656	
Significant Value	0.000	
Rank 1= pressing is a high cost of feed		
Rank 5=least limiting is lack of quality day-old chicks;		

Production constraint

Again, Kendall's coefficient of concordance was used to find the most limiting constraints among the resource constraints to the farmer based on production constraints. Under the production constraint, Inadequate training, lack of infrastructure/processing technology, inadequate capacity building, and disease outbreaks were the input constraints identified by the poultry farmers.

The results from Table 20 indicate that lack of infrastructure/processing technology was the most limiting challenge faced by the poultry farmers in their poultry production with a mean rank of 2.31 and inadequate capacity building was the second most limiting constraint with a mean rank of 2.46. However, disease outbreak was noted to be the least limiting constraint to these farmers with a mean rank of 2.66 followed by Inadequate training being the second least limiting constraint with a mean rank of 2.57. Kendall's W was used to analyze the degree of agreement between the ranks. It shows that 2.3 percent of the poultry farmers agree that lack of infrastructure/processing technology is the most limiting constraint faced by the poultry farmers followed by inadequate capacity building. Likewise, Adei et al. (2012) revealed that in addition to diseases influencing poultry output, the unavailability of poultry processing technology is another difficulty confronting the poultry sector. As a result, the majority of these farmers lack the financial means to invest in this technology. Again, most of these farmers do not have access to loans to obtain this technology, so they depend on traditional poultry production methods, which do not guarantee the greatest results (Adetayo et al., 2013).

Table 20: Production Constraint

Items	Mean Rank	Ranking
Disease outbreak	2.66	4th
Lack of infrastructure/processing technology	2.31	1st
Inadequate capacity building	2.46	2nd
Inadequate training	2.57	3rd

Source: Abdoni, (2021): Sample size (n) =130; Number of ranked barriers=4; df =3; Rank 1= pressing is lack of infrastructure; Rank 5=least limiting is disease outbreak; Kendall's W=0.023; Chi square (x^2)= 7.973; Level of sig=0.047

Marketing Constraint

Moreover, Kendall's coefficient of concordance was used to find the most limiting constraints among the resource constraints to the farmer based on marketing constraints. Under the marketing constraint, High competition from cheap imported chicken, high competition from cheap imported chicken, and low prices of poultry products were the marketing constraints identified by the poultry farmers.

The results from Table 21 indicate that lack of high competition from cheap imported chicken was the most limiting constraint faced by these poultry farmers in their poultry production with a mean rank of 1.96. However, low demand for poultry products was noted to be the least limiting constraint to the farmers with a mean rank of 2.04. Kendall's W was applied to assess the level of agreement among poultry farmers regarding the ranking of challenges. The analysis indicates that only 0.3 percent of the farmers agreed that high competition from cheap imported chicken is the most limiting constraint they face. Like many others, Atuahene et al. (2010) contended that the Ghanaian market is swamped with inexpensive imported poultry goods from the European Union, the United States of America,

and Brazil. The surge of imported poultry products has diminished the market for domestically produced poultry, jeopardizing the lives of several Ghanaian farmers, regardless of the size of their operations. Hence, consumer preference has shifted towards foreign birds in neglect of local birds which continues to discourage local producers in the market.

Table 21: Marketing Constraint

Items	Mean Rank	Ranking
High competition from cheap imported chicken	1.96	1st
Low prices of poultry products	1.99	2nd
Low demand of poultry products	2.04	3rd

Source: Abdoni (2021): Sample size (n) =130; Number of ranked barriers=3; df =2; Rank 1= pressing is high competition from cheap imported chicken; Rank 5=least limiting is low demand of poultry products; Kendall's W = W=0.003; Chi square (x^2)= 0.706; Level of sig=0.703

Policy constraint

Finally, Kendall's coefficient of concordance was employed to find the most limiting constraints among the resource constraints to the farmer based on policy constraints. Under the policy constraint, Inconsistent government policies, Lack of government support or subsidy, and trade liberalization were the policy constraints identified by the poultry farmers.

The results from Table 20 indicate that trade liberalization was the most limiting constraint faced by these poultry farmers in their poultry production, with a mean rank of 1.94. However, lack of government support or subsidy was noted to be the least limiting constraint to these farmers, with a mean rank of 2.08. Kendall's W was used to analyze the degree of agreement between the ranks, and it shows that

2.2 percent of the poultry farmers are in agreement with each other that trade liberalization is the most limiting constraint faced by the poultry farmers, followed by inconsistent government policies.

Table 22: Policy Constraint

Items	Mean Rank	Ranking
Inconsistent government policies	1.97	2nd
Lack of government support or subsidy	2.08	3rd
Trade liberalization	1.94	1st

Source: Abdoni (2021): Sample size (n) =130; Number of ranked barriers=3; df =2; Rank 1= pressing is trade liberalization; Rank 5=least limiting is lack of government support; Kendall's W=0.022; Chi square (x^2)= 5.099; Level of sig=0.078

Challenges face by AEA in the process of performing their tasks

The results from Table 23 show that the most significant challenge faced by extension agents in their service delivery is difficulty in managing diseases, which received a mean rank of 2.55. Additionally, the second most limiting constraint is delays in reporting issues, with a mean rank of 3.70. However, drastic changes in the composition of farmers were noted to be the least limiting constraint to these extension officers with a mean rank of 9.20 followed by the unwillingness of farmers to cooperate being the second least limiting constraint with a mean rank of 6.90. Kendall's W was used to analyze the degree of agreement between the ranks and it shows that 44.8 percent of the extension agents are in agreement with each other that difficulty in dealing with diseases is the most limiting constraint faced by the extension officers followed by delay in reporting issues. Likewise, Adei and Asante (2012) revealed that one of the main obstacles slowing the rate of expansion of Ghana's poultry and livestock subsectors is disease when studying the challenges

and prospects of the poultry industry in Dormaa District. The study further stated that about 60 percent of the poultry industry complained of disease as the major challenge that impedes the activity of the poultry industry. This is a result of the majority of poultry farmers in Ghana being small-scale farmers and consequently encountering financial constraints in fighting diseases on their poultry farms (Thomas, 2017).

In general, it is believed that diseases and their control are threats to the poultry industry. Again, the outbreak of diseases and pests continues to impact the poultry industry and limits the industry's expansion. The spread of disease and pests on the farms is simple and rapid since the birds live close to one another, especially with the majority of commercial poultry firms that use the intensive and semi-intensive system of growing poultry. For instance, the impacts could be damaging to the farm if a bird is infested with pests or afflicted with a disease and is not isolated on time or adequate precautions are not taken to safeguard the safety of that bird or the other birds on that farm (Haligah, 2017).

Table 23: Challenges faced by AEAs

Items	Mean Rank	Ranking
Difficulty in dealing with diseases	2.55	1st
Delay in reporting issues	3.70	2nd
Financial constraints	4.00	3rd
Low number of staff	6.50	4th
Ineffective communication channels	5.50	5th
Logistical constraint	5.30	6th
Inaccessibility of farms	4.55	7th
Inadequate training in poultry production	6.80	8th
The unwillingness of farmers to cooperate	6.90	9th
Drastic changes in the composition of farmers	9.20	10th

Source: Abdoni (2021). Sample size (n) =10; Number of ranked barriers=10; df =9; Rank 1= pressing is difficulty in dealing with diseases; Rank 5=least limiting is drastic changes in the composition of farmers; Kendall's W=0.448; Chi square (x^2)= 40.358; Level of sig=0.000

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATION

Introduction

This chapter provides a summary of the study's findings, followed by the conclusions drawn from the research. It also includes recommendations based on the results and suggests areas for future research.

Summary

The growing demand for poultry and poultry products in the Central Region's local market in recent times is significant. This trend highlights the necessity for smallholder poultry farmers to transition from subsistence production to the commercialization of their poultry farming businesses. To do so, poultry farmers needed to increase their level of competency to enable them to scale up production for the ever-increasing market available in the Region and beyond. The AEAs from the Ministry of Food and Agriculture are to ensure the transfer of knowledge (competency) and build farmers' acumen towards production. Therefore, there is a need to assess poultry husbandry management competencies of farmers and the challenges faced by agricultural extension agents in selected districts in the central region of Ghana.

The correlation survey design was used for the study, which was conducted in the Awutu Senya West, Gomoa East, and Agona districts of the Central Region. The population of the study included all agricultural extension agents (AEAs) and all registered poultry farmers from the Departments of Agriculture in these districts. A census survey covered all 130 poultry farmers and 11 AEAs within the study

area. Data was collected using a structured interview schedule for the farmers and questionnaires for the AEAs. The data was analyzed using frequency, percentages, mean, regression, and Kendall's concordance coefficient.

Major findings of the study

The background characteristics of the farmers

The results on the sex revealed that the majority (88%) of the farmers in poultry production were males, compared to their female (12%) counterparts. The findings show that 97 percent of farmers had some form of formal education, while the minority (3%) had no formal education. The level of formal education of the farmers indicates that more than 50 percent (71) had a tertiary level of education. The results revealed that 50% of the farmers were 40 years or younger, with an average age of 40 years. More than 54.6% of farmers had one to two household members, approximately 39 percent reported having three to four household members who assisted in poultry production, and only one farmer had seven household members. The household size of the farmers ranges from one to eight, with an average of four. The majority of the farmers were engaged in rearing livestock (25%) as an additional source of income for their poultry business, while the minority were engaged in hunting (6%). A greater number of farmers (74.5%) financed their poultry farms from personal resources, while a few (5.4%) accessed loans for production. The majority of the labour force in poultry production comes from family labour, accounting for 57.0 percent of the total workforce. Additionally, 58 percent of the farmers had received no formal training in poultry

production, while 42 percent had had formal training. Only 37 percent of the poultry farmers were members of farm-based organizations, while 63 percent were not.

The background characteristics of the AESs

The male AEAs (70%) were dominant over females (30%). Six out of ten AEAs had a Bachelor of Science in Agriculture or a master's level of education, while two each were diploma or certificate holders. The results indicate that 40 percent of the AEAs were 40 years and below, while 60 percent were 41 years and above. The average age of the AEAs was 42 years. Less than 20 percent of the AEAs had one to ten years of experience, while 80 percent had 11 years or more experience. The experience levels among the Agricultural Extension Agents (AEAs) ranged from a minimum of 4 years to a maximum of 34 years, with an average experience of 18 years. Among the 10 AEAs, 7 have participated in training once, while 1 AEA has attended training twice.

The nature of poultry production

The majority of the farmers, representing 73.8 percent, were using deep litter production structures, while 15.4 percent were using battery cage production structures. Furthermore, it was discovered that 61 percent of the farmers make use of breeder farms, 15 percent use hatcheries, and 23 percent utilize feed mill buildings. The majority of the farmers (86%) import their day-old chicks from external sources, with only 14 percent relying on local sources for their day-old chicks. The study revealed that out of 130 farmers, nearly 100, representing 76.2 percent, owned less than 1000 birds, with only one farmer owning more than 4000 birds. The minimum number of birds owned by farmers was 44, and the maximum

was 4050, with an average of 362 birds. Most farmers (86%) import their day-old chicks from Europe, while a few (14%) rely on hatcheries in Accra and Kumasi for their chicks.

Perceived competencies in poultry production

The results revealed that the farmers possess higher knowledge in determining appropriate sources of healthy birds (MWSD = 1.2), sanitation (MWSD = 1.6), identification of the various poultry diseases (MWSD = 1.65) and Selection of appropriate structure type for birds (MWSD = 1.75). The farmers also possess a moderate knowledge in health management (MWSD =2.1), breeding and genetics (MWSD = 2.05, and Provision of lighting for birds (MWSD = 2.3). However, the findings also reported that the farmers possess low competency in periods of vaccination (MWSD = 12.3) and periods of disinfestation (MWSD = 12.3). Periods of vaccination and periods of disinfestation were discovered with the highest MWDS, suggesting significant gaps in knowledge and practices that require immediate attention and training.

Factors Influencing Perceived Competency

Farm households with more members were found to be 0.492 times more likely to increase their level of competence in poultry production. Farmers who have access to extension services were found to be 0.357 times more likely to see their competency levels improve in poultry farming. Poultry farmers who are members of farm-based organizations have a 0.550 times higher chance of improving their competency compared to those who are not members. In terms of formal training, it was found that farmers with some forms of training were 0.181

times more likely to exhibit a high level of competency in poultry production compared to those without any formal training. Additionally, the analysis indicates a significant positive correlation (0.347) between the years of experience a poultry farmer possesses and their level of competency. Additionally, the analysis indicates a significant positive relationship (0.347) between the years of experience a poultry farmer possesses and their level of competency.

Perceived Challenge in poultry production from the perspective of farmers

The results indicate that the inadequate quality of day-old chicks (Mean = 8.25) and disease outbreaks (Mean = 8.25) were the most limiting challenges faced by poultry farmers in their poultry production. However, high trade liberalization was noted to be the least limiting constraint to the farmers with a mean rank of 12.40 followed by the high cost of feed being the second least limiting constraint with a mean rank of 12.96.

Challenges face by AEAs

The results indicate that difficulty in dealing with diseases was the most limiting challenge faced by the extension agent in their service delivery with a mean rank of 2.55 and with delay in reporting issues being the second most limiting constraint with a mean rank of 3.70. However, drastic changes in the composition of farmers were noted to be the least limiting constraint to these extension officers with a mean rank of 9.20 followed by the unwillingness of farmers to cooperate being the second least limiting constraint with a mean rank of 6.90.

Conclusion

Based on the findings of the study, the following conclusions were made.

Poultry production is predominantly male dominated, with farmers typically around 40 years old and having received formal education. Most households of poultry farmers consist of one to four members. In addition to poultry, these farmers rear other livestock as an additional income source. They primarily finance their poultry operations from personal resources and rely on family labour. However, some poultry farmers lack formal education and are not members of farm-based organizations.

The field of AEAs is predominantly male dominated. AEAs are relatively young, with an average age of 42 years. They are highly educated, hold Bachelor of Science degrees, and possess significant experience in terms of years of service. However, they rarely receive in-service training.

Farmers mainly employ deep litter production structures and breeder farms but few use hatcheries and feed mill buildings. Farmers import their day-old chicks from external sources.

Furthermore, the farmers have a strong understanding of determining appropriate sources of healthy birds, maintaining sanitation, identifying various poultry diseases, and selecting appropriate structure types for birds. They also have a moderate level of knowledge in health management, breeding and genetics, and providing lighting for birds. However, there are significant gaps in their knowledge regarding the periods of vaccination and disinfestation, with these areas showing

the highest need for improvement. This highlights the necessity for focused training and education to address these critical deficiencies.

Fifthly, larger household sizes correlate positively with increased competency in poultry production, suggesting that more family members contribute to operational success in poultry production. Access to extension services enhances farmers' competency, highlighting the role of professional support in improving agricultural practices. Membership in farm-based organizations significantly boosts competency, indicating the benefits of collective knowledge sharing and resource access. Formal training is crucial, as farmers with training demonstrate higher competency levels, emphasizing the importance of structured education. Additionally, years of experience positively correlate with competency, illustrating how practical knowledge gained over time enhances farm management skills.

Sixthly, inadequate quality of day-old chicks and disease outbreaks emerge as the most significant constraints, underscoring their detrimental impact on poultry production. These challenges likely contribute to decreased productivity and profitability within the sector. Conversely, high trade liberalization and the high cost of feed are perceived as fewer limiting factors by farmers. This suggests that while certain external economic factors pose challenges, they are considered less pressing compared to issues directly affecting the health and quality of poultry stock.

Finally, agricultural extension agents face significant challenges in their service delivery, with disease management emerging as the most pressing issue. This indicates that addressing disease outbreaks is crucial for improving the

effectiveness of extension services and supporting farmers in achieving better outcomes. Delayed reporting of issues ranks as the second most limiting constraint, suggesting that improving communication and response times could enhance the efficiency of extension activities. Conversely, drastic changes in farmer composition and farmers' unwillingness to cooperate are perceived as fewer limiting factors.

Recommendations

Based on the conclusion of the study, the following recommendations were made.

1. The Ministry of Food and Agriculture through its AEAs should provide more poultry programmes/ projects to increase participation in farm-based organizations among poultry farmers. These organizations can serve as valuable platforms for knowledge sharing, accessing resources, and advocating for the interests of poultry farmers collectively.
2. MoFA should intensify continuous professional development opportunities for AEAs, including advanced training and specialization courses, to ensure they stay updated with evolving agricultural practices and technologies. Increasing the frequency of training sessions and expanding access to online resources can also help AEAs enhance their competencies and adaptability in addressing contemporary challenges faced by farmers.
3. MoFA, in collaboration with other stakeholders, should build and improve the capacities of local hatcheries in Accra, Kumasi, and the

Central Region to produce high-quality day-old chicks that meet the diverse needs of poultry farmers. The one in Cape Coast will help reduce the cost of transportation and other overhead cost.

4. MoFA and the commercial Banks should provide technical assistance and financial incentives to encourage farmers to transition from deep litter production to more sustainable systems like battery cages and improved breeder farms to promote better bird health and productivity.
5. Priority should be given to the Universities to develop comprehensive training modules on vaccination schedules and procedures, as well as effective methods for poultry disinfestation. These programmes should be designed to improve farmers' understanding and implementation of critical health management practices, thereby enhancing disease prevention and control measures on poultry farms. Collaborative initiatives involving agricultural extension services, veterinary professionals, and relevant stakeholders should be encouraged to ensure the effective dissemination of up-to-date information and best practices in poultry health management.
6. AEAs should provide enhanced access to extension services to further improve farmers' competency levels, which underscores the importance of professional guidance and support in enhancing agricultural practices.

7. MoFA should focus on implementing stringent quality control measures in sourcing day-old chicks and enhancing disease prevention and management strategies. Investing in research and development to develop resilient poultry breeds and vaccines can also mitigate these challenges. Finally, MoFA should focus on strengthening disease surveillance, early detection, and rapid response mechanisms. This could involve training extension agents and farmers in disease identification, prevention, and control measures. Additionally, improving the availability and accessibility of veterinary services and resources can support effective disease management at the grassroots level.
8. MOFA should be implementing systems for prompt reporting and feedback mechanisms between farmers and extension agents that can help in timely intervention and support. Enhancing communication channels, such as mobile technology platforms or community networks, can facilitate quicker information exchange and problem-solving

Suggestion for further study

Based on the study results and conclusion, the following are suggested for further study,

1. Investigate the economic implications of different poultry husbandry management systems (e.g., deep litter vs. battery cage systems) in the context of the Central Region of Ghana. Compare production costs,

profitability, and sustainability factors such as resource use efficiency and environmental impact.

2. Investigate the resilience of poultry farming systems to climate change impacts in the Central Region. Assess adaptation strategies adopted by farmers, such as improved housing designs, water management practices, and feed formulation adjustments. This study could provide insights into building climate-resilient poultry husbandry management systems and mitigating climate-related risks.

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