

**ASSESSMENT OF THE POTENTIAL OF AGRICULTURAL  
EXTENSION DELIVERY ON GUINEA FOWL (*NUMIDEA  
MELEAGRIS*) PRODUCTION BY SMALL SCALE FARMERS IN THE  
UPPER EAST REGION OF GHANA**

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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,  
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## DECLARATION

I, **Zimi Alhassan** the author of this thesis titled “**Assessment the Potential of Agricultural Extension Delivery on Guinea Fowl (*Numidea meleagris*) Production by Small Scale Farmers in the Upper East Region of Ghana**” do hereby declare that except for various forms of assistance reference to other people’s work which have been duly cited and acknowledged, this thesis is the result of my original work , produced under supervision, and that has never been presented either in part or whole for the award of any degree in this university or elsewhere.

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## ABSTRACT

The guinea fowl is an abundant species in almost all the traditional homes, providing meat eggs and swerving as a source of income. The guinea fowl production is however read extensively in almost all house households in the three Northern Regions. The birds are left on free range to feed themselves. A few farmers however provide some form of accommodation during the night. This study was conducted to assess the Potential of the Agricultural Extension Delivery on Guinea fowl (*Numidea meleagris*) Production by Small Scale Farmers in the Upper East Region of Ghana. Questionnaires were used to purposively collect data from 120 farmers and 18 Agricultural Extension Agents (A.E A). Descriptive statistics and chi-square were used for statistical analysis. The study found that the major problems of the small scale farmers were high keet mortality. The problem was further made worse due to low knowledge of extension agents to deliver extension messages that address the problems of the farmers.

The results from the survey showed that the socio-economic characteristics of the farmers had an influence on their agricultural information search behaviour. The study specifically found that 92.5% Of the respondent earn less than GH¢1000.00 per annum and this had an influence on the level of their operation and the technology uptake as 64.2% of the farmers practice the free range (traditional) system of management. On extension delivery the result showed that farmer's participation in extension programme development could influence the process of extension delivery. Majority of the farmers preferred interactive methods and channels. 59% preferred communicating to them using group approach to organising farmers. Agricultural Extension Agents remained a major preferred channel of extension delivery to the small scale farmers in addition to input dealers and the use of mobile phones. The study found that only 16.9% of the respondents were reached by Extension Agents on fortnightly basis. The curricula of agricultural training institutions

and the in-service trainings offered by Ministry of Food and Agriculture are not adequate to the needs of the guinea fowl farmers. This has led to low knowledge and skills of Extension Agents on fowl husbandry. Though MoFA is a preferred organization by many of the respondent in terms of extension delivery the private organization were ranked 66% against 41% in terms of reliability of extension messages on guinea fowl production. The study then proceeded to recommend a review of the curricula of the agricultural training institutes to make them more relevant to demands of the small scale guinea fowl farmers. A collaborative approach of institutionalized training programme on guinea fowl production could be designed by the actors as well as promoting the Public Private Participation in extension delivery to address the shortfall in extension delivery the small scale guinea fowl farmers.

## **DEDICATION**

This work is dedicated to my lovely wife Mrs Rhoda Zimi and my children, Vera Wiisewie Zimi, Marilyn Nbelinwiise Zimi and Nicholas Winyem-mer Zimi whose education, love and comfort I sacrificed for the course. I also the efforts and sacrifices of my late senior brother Mr A. B. Maamu who has modelled me to this level but did not live to see the final outcome of his efforts

**LIST OF ACRONYMS**

<b>AAGDS</b>	Accelerated Agricultural Growth and Development Strategy
<b>ADB</b>	African Development Bank
<b>A.E.A</b>	Agricultural Extension Agents
<b>CEPA</b>	Centre for Economic and Policy Analysis
<b>CoS</b>	Convergence of Sciences
<b>DAES</b>	Directorate of Agricultural Extension Services
<b>GDP</b>	Gross Domestic Product
<b>GPRS</b>	Growth and Poverty Reduction Strategy
<b>GUIFFA</b>	Guinea Fowl farmers Association
<b>FAO</b>	Food and Agricultural Organization
<b>IAEA</b>	International Atomic Energy Agency
<b>ISSER</b>	Institute of Statistical, Social and Economic Research
<b>KNED</b>	Kasena Nankana East District
<b>KNWD</b>	Kasena Nankana West District
<b>METASIP</b>	Medium Term Agricultural Sector Investment Plan
<b>MoFA</b>	Ministry of Food and Agriculture
<b>M/DADU</b>	Municipal/ District Agricultural Development Unit
<b>MISO</b>	Management and Information System Officer
<b>NAEP</b>	National Agricultural Extension Project
<b>NCD</b>	New Castle Disease
<b>NGO</b>	Non-Governmental Organization
<b>NRI</b>	Natural Resource Institute
<b>PPP</b>	Public Private Partnership
<b>PRA</b>	Participatory Rural Appraisal
<b>PHC</b>	Population and Housing Census
<b>SSA</b>	Sub Saharan Africa
<b>UCC</b>	University of cape Coast
<b>UES</b>	Unified Extension System
<b>UG</b>	University of Ghana
<b>USDA</b>	United States Development Agency

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## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.0 Introduction**

This chapter deals with the introduction and background to the study. It gives a brief background to the study, statement of the problem, the research question and the objectives of the study. It also explains the justification and the scope of the study.

#### **1.1 Background to the Study**

Agriculture has been the backbone of Ghana's economy throughout the post-independence until in the recent years when the service sector started to dominate the economy. The agricultural sector however is characterized by the use of low inputs, high dependence on rain-fed and dominance of the small holder farmers, missing support for innovation in the small holder agriculture, poor transport and distribution channels.

The agricultural sector according to Aning (2006, p.14) accounts for 41.1% of the Gross Domestic Product (GDP) of the economy of the nation and that 60% of the labour force engaged in the agricultural sector undertake mostly crops and livestock or poultry production. The sector has contributed to reduction of the percentage of the population of people living below the poverty line reduced nationwide from more than 50% in 1991 to 40% in 2004. This, according to Berg et al (2006, p. 35) is due to the fact that poverty reduction has been unevenly distributed in Ghana. The share of people living in less than US\$1.00 per day remained unchanged in the Eastern and Upper West Region and has increased in Central, Northern and Upper East Regions. In the three northern regions between 70% and 90% of the population are categorized as extremely poor. The major cause of the chronic poverty is attributed to the poor performance of the agricultural sector. The sector also lack of requisite investment. Nazneen and Stephanie (2002, p. 14) added

that small scale agriculture accounts for the production of more staple food and employment than the large commercial concerns in Sub Saharan African (SSA). Areas of concentration production of these smallholder agricultural economies are also the areas where majority of the population is engaged. An estimated 70 to 75 per cent of the world's poorest people live in rural areas where their livelihoods are largely dependent on agriculture. Many of these rural poor are smallholder farmers who are often seen as efficient users of resources and their system of farming is classified as an equitable means of providing income and food directly to the poor. According to Helin et al (2005), these smallholders are characterized and represent those whose activities are on subsistence level where family labour and farming is the major source of livelihood. The purpose of production of these large numbers of small-scale producers is to address their immediate needs of providing food for the household before other interests are considered.

An assessment of the local production for the School feeding Programme in Ghana by United State Department of Agriculture (USDA) in 2009, reveal that Ghana's agriculture meets only 50% of the domestic cereal needs, 60% of domestic fish consumption and less than 30% of raw material needed for agro-based industries. The level of self-sufficiency in food items however varies from 30% for rice and 92% for maize. Furthermore, Aning (2010, p. 141) reported that the agricultural sector of the Ghanaian economy grew at an average of 4.6% between 2000 and 2007 and 5.1% in 2008 and posted a remarkable growth of 6.2% in 2009. This rate of growth is driven largely on account of favourable rainfall and good growth of the cocoa subsector and by extension of land under cultivation. Livestock including poultry are important to millions of poor people across the world as a source of income, nutrition and as a store of wealth for the majority of marginal and small farmers. In the view of Ahuja et al (2001, p. 1) because majority of these livestock farmers are small scale farmers, there are no mechanism in place to identify and resolve their

extension service delivery needs which tends to be expensive simply because of the large gaps between the Extension Agent and these farmers. The policy priorities and direction of extension delivery in Ghana and for most developing countries often get determined by the biases and beliefs of decision makers under the influence of the few large scale farmers.

There are several reasons for which farmers keep livestock. According to Killebrew et al (2010, p. 1) majority of rural and urban farmers keep some type of poultry to meet their food and to supplement their cash needs. The major constraint of these categories of smallholder farmers is the high cost of veterinary services which represents their main source of extension services. This led to significant shortfall in the production levels and inability of these smallholder farmers to meet the national production requirement. The national animal protein supply from these smallholder poultry farmers constitute just 40% with the rest coming from fish but in the face of depleting fish stock in Ghana's territorial waters and undeveloped aquaculture industry there is the need to for expanded poultry production for nutritional purposes and job creation especially in the rural areas (Aning, 2006, p. 28).

Another major constraint to the development of the domestic poultry is associated with the consumption pattern of the urban dwellers in Ghana. The urban dwellers are mostly associated with consuming imported frozen meat and poultry products. The reason for this according to Rondon et al (2010 p. 3) is that it is cheaper than the locally produced poultry. The imported poultry products for the 5 years period from 2002 to 2007 shows that the imported poultry were cheaper than the locally produced poultry meat. Imported poultry tend to be cheaper by 30-40%. The unrestricted importation mostly from Europe and America of heavily subsidized poultry, meat sell more cheaply on the local market has contributed immensely to the depression of local poultry production in Ghana.

In 1999 a special tax of 20% was imposed on poultry meat imports to Ghana to protect the local industry. This was revised downwards to 10% soon after and eventually removed in 2002. This caused a sharp increase in poultry imports. Despite the imposition of tax on imported poultry products imported into the country it is still cheaper and has led to an unbridled importation of poultry from developed countries into the country. In 2010 Ghana imported 98,000MT of frozen chicken meat from United States, Brazil and the EU. Official statistics of MoFA (2010) shows that poultry import have quadrupled from 20,000MT in 2002 to 98,000MT in 2010 as a result of liberalization of imports of poultry meat. In 2007 the government of Ghana has acted to restrict the importation as well as provide direct support to the poultry industry but the activities of unauthorized importers are thwarting the efforts of the government.

Poultry production remain an important household agricultural activity in Northern Ghana where more than half of all rural households keep small-scale, with flock sizes ranging from 1 to 500 birds.

Northern Ghana dominates in the production of local chicken and Guinea fowl. The Northern region leads in the production of local fowl whilst the Upper East Region is the leading producer of Guinea fowls in Ghana

The poultry component of the Ghanaian economy serves as a “safety net” because it provides an important source of ready cash for emergency needs for the households that keep them. The sector contributes 7% to the agricultural GDP and plays an important role in the rural livelihoods and food security (MOFA, 2010 p. 7) poultry farming represents one of the strategies of farmers to generate income and increase access to animal protein. Poultry offers the best yield in converting vegetable calories into high yield animal protein. This is attainable even under the extensive management system which accounts for 70% of

poultry production and 20% of animal protein intake in most African countries which comes from village poultry. Therefore increasing rural poultry production through the Guinea fowl production would result in a positive impact on household food security both through increased dietary intake and indirectly income generation. Despite the potential of the Guinea fowl as an active contributor to the rural folk in terms of economic, cultural, livelihood and social values in the lives of rural populace in the three northern regions of Ghana, it is hardly counted in wealth ranking as in the case of cattle, sheep and goats. (Kusina, et al 2012, p. 1). Furthermore poultry production is not rated among the main national economic activities because of lack of measurable indicators as it is characterised by low levels of production and output in terms of weight gain, number of eggs per hen in a year are very low with relatively high mortality (IAEA, 2006, p. 99).

An observed phenomenon accounting for the low productivity of Guinea fowl is attributed to the extensive or the traditional system of management which according to Naadam and Issah (2012 p. 252) is associated with myriads of problems including “diseases and intestinal parasites, inadequate feeding, unavailability of eggs for hatching in the dry season, low growth rate, and lack of improved genetic material”. The cumulative result of these problems is low production, paucity of information on traditional Guinea fowl production practices. This is evidenced in the fact that production is rudimentary resulting in undeveloped performance of the Guinea fowl industry. Production is also dominated by small scale producers. Schmitz et al, (2009 p. 2) indicated that, despite the dominance of small scale farmers, production is high, and concentrated in the three northern regions of Ghana where poverty is extremely high as poultry production accounts for 2.1% of Northern Savannah share of agriculture

## 1.2 Agricultural Extension Education in Ghana

According to Nyan Duo and Bruening (2007, p.7) professionals in agricultural extension constitute the least trained group of staff in most African agricultural extension organizations. This is because the initial formal extension education was inadequate. In addition where in-service training was usually provided, it was often ad hoc and not responsive to the changing nature of extension. Thus most extension professional lacked the knowledge and skills required to be effective when working in complex and rapidly changing agricultural environment. For agricultural education in Ghana to facilitate the needed systematic change, a clear political environment, with clear vision and mission statement that cut across agriculture and rural development should be articulated. This should address the issues of theoretical contents of agricultural training curricula towards acquisition of practical training and acquisition of off-campus occupational experience,

Following independence in 1957, Ghana established agricultural institutions to train the manpower needed for agricultural and rural development. These institutions include:

- 1) The College of Agriculture and Consumer sciences of the University of Ghana (UG) in Accra;
- 2) The School of Agriculture, Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi;
- 3) The School of Agriculture, University of Cape Coast (UCC) in Cape Coast and
- 4) The Faculty of Agriculture, University of Development Studies (UDS) in Tamale.

In addition six agricultural training colleges have been set up to allow senior secondary school graduates pursue Certificate and Diploma programmes in agricultural studies. The Agricultural training colleges are:

- 5) The Animal Health and Production College at Pong-Tamale in the Northern Region,

- 6) The Ejura Agricultural College in the Ashanti Region,
- 7) The Kwadaso Agricultural College located in the Ashanti Region,
- 8) The Damongo Agricultural College in the Northern Region and,
- 9) the Ohawu Agricultural College in the Volta Region
- 10) The Department of Agricultural Education, University College of Education (UCE), Mampong in the Ashanti Region.

In furtherance of this the government established Farm Institutes at Wenchi, Asuansi and Adidome to train farmers in specialised areas of agricultural activities but this scheme does not receive the patronage of farmers.

According to Zinnah et al (nd, p.5) the curricula of all these agricultural training institutions in Ghana concern such courses such as crops science, soil sciences, animal sciences, agricultural economics and agricultural engineering. These teachings and learning process is mostly confined to theory in the classroom. In contrast there was a general agreement among the subgroups of employers that existing curricula and courses were not producing graduates who were not responsive to the end user. There was therefore the need to include in the curricula of the agricultural training institutions topics that are client focused. Shiferaw and Murthy (2013) in corroborating this view indicated that despite all the literature trumpeting the role of agriculture in the economies of developing countries, extension has been and still is treated as an inferior subject by most agricultural research organizations, despite evidence that if there is weakness in extension, some valuable technologies never end in the hands of the farmers. It is also undoubted that trainings provided to extension agents were crop production oriented.

Furthermore Owen et al (2007) have indicated that as a step to improve upon agricultural education in Ghana in 1993 the University of Cape Coast under the Sasakawa African fund

for Extension Education (SAFE) introduced an innovative extension programme in the University Of Cape Coast in collaboration with MoFA, Winrock International, MoFA to improve extension education in Ghana for middle level extension officers. The emphases in the programme were critical thinking and methodological skills to solve farmer's problems.

Others include non-traditional agricultural commodities such as mushroom, bee keeping, snail production, grass cutter and rabbit rearing. However guinea fowl which belong to this category of agricultural commodities and widely kept by most household in northern Ghana was deliberately left out in this programme thereby not addressing the potential for the development of the guinea fowl industry.

To make extension delivery more participatory at the grass root level, many governments, the governments of developing countries adopted the decentralization policy which aims at devolution of power and resources to the local level as a deliberate strategy to ensure that extension delivery is more client focused. The policy also allows local people to prioritize the agricultural needs to suit their resources. According to Kalim Qamer (2005) while decentralization is a step in the right direction it has proved so far to be disastrous for agricultural extension in several developing countries. While autonomy in programming is to be secured at each district or municipality to go its own direction without regard for national policy and priorities it has been subject to the influence by local politicians and decision makers who cannot appreciate the importance of extension in rural and agricultural development.

In a similar vein D: S.R.D (nd, p.164) indicated that the government of developing countries needs more efforts in order to broaden access to agricultural services including

agricultural extension information. There is thus the need for extension services to present serious service activities in respect of efficiency and relevance of content of programmes focus. This can be done through the facilitation and the establishment of extension information and service centres in Ghana. However logistics constraints have limited the full decentralization of extension in developing countries.

It is noted that in Ghana both the central government and development partners have not realised the need to invest on guinea fowl production. In support of this CEPA (2005, p.45) indicated that the greatest potential in the Northern Ghana has been in the developing the Guinea fowl value chain. There is substantial demand for this high value product which is produced in almost every household on a backyard basis. The Guinea fowl is also noted to contribute hugely to food security in most parts of Northern Ghana, however the area remain dependent on low return food crops leaving this great investment potential that could turn the economic fortunes of the area around neglected.

### **1.3 Knowledge and Skills of Extension Agents.**

The major challenge of extension delivery in Ghana is attributed to poor information support by management of extension organizations and research organization to Agricultural Extension Agents. To address this challenge the government of Ghana instituted the Unified Extension System (UES) under the National Agricultural Extension Programme (NAEP) in 1997. The Unified Extension System approach failed mainly due to methodological and resource constraints issues, the implication being that the approach did not meet the needs of all categories of farmers especially the majority of the small scale farmers. (Zaney, 2011).

D.A.E.S-MoFA (nd) indicated that the effectiveness of extension in enhancing the capacity building, technology adoption and ultimately improved agricultural output depends on key factors in relation to extension methods used, governance, capacity and management of the extension approach as well as contextual factors such as policy environment, market access, characteristics of beneficiary communities and weather condition.

According Asiedu-Darku (2013) effective dissemination of agricultural technologies is crucial in agricultural development and this is especially the role played by extension agents. The effective dissemination of innovative technologies by the extension agents requires the needed competencies to improve their effectiveness. All the professional competencies are usually learned and developed after extension agents are employed. This require an articulated continuing education programme which addresses the specific professional needs of agents. According to Agor et al (2002) continuing education is a necessity especially for A.E.A's on whom farmers depend for information to increase production of abundant and quality food. However opportunities for such education are not readily available and where available, training materials are not often provided to which A.E.A's can refer at critical times in their work.

Furthermore Annor-Frempong et al (nd) stressed that the Training and Visit (T&V) system in which agents communicate through lead farmers to other farmers has contributed significantly to loss of information associated with the dissemination approach because these vital information passes through many channels before reaching the final user.

According to Halilu (2012) for Extension Agents to accomplish their work satisfactorily, he/she must have great skills of judgement, deep understanding of people and a high level of technological expertise. Contrary to this, in Ghana as in most developing countries,

Extension Agents work is often carried out under conditions of insufficient funding with agents lacking requisite skills and the needed logistics.

In addition, Ovwigho (2011) indicated that there are two major types of training programmes that enhances the performance of extension agents (-on the job and pre-employment employment training). On the job training is the type of training given to an individual who is employed but requires certain knowledge and skills to improve efficiency. The pre-employment training is the type given to an individual who has developed a theory of identification of training needs for extension.

In the view of Lakai (2010) in-service training is the most appropriate opportunity for Extension Agents to acquire additional or the needed operational competencies, This is usually conducted in the face to face training workshops and are considered the most effective educational method for extension workers. The basic constraints of Extension Agents in Ghana include the fact that the circular formal trainings does not equip extension agents with competences to meet the needs of all the category of farmers and the course content are usually unsuitable to the employment of trainees and that most students lack exposure and actual experience to address practical field problems. These practical skills and gaps are addressed during the in-service trainings

#### **1.4. The Benefits of Guinea Fowl Production**

Farmers keep the guinea fowl for various reasons but in recent times the economic potential of the bird and its contribution to the growth of rural economy of Ghana has further affirmed the reasons for keeping the bird. The meat of the guinea fowl has a high demand due to the increasing awareness about its taste, nutrition and health implications. Rearing of the chickens serves as a means of providing supplementary food, in the form of

animal protein and also provides a means of savings in order to respond to emergencies and provision of prime necessities especially when there is crop failure due to bad weather.

Culturally, Teye et al (2000 p, 14) in conducting a case study of the production practices in the Damongo area discovered that the guinea fowl is of cultural significance in Northern Ghana as it has a lot of functions in religious sacrifices, performance of funerals, welcoming of mother in laws among most tribes in northern Ghana and also has exclusive usage during the Guinea fowl festivals of Dagombas and Gonjas in Northern Ghana. The guinea fowl also represents a reliable and active contributor to the survival of rural folks since it has economic, cultural, livelihood and social values in their lives (Kusina et al, 2012, p.1)

According to Ikani and Dwafang (2004, p. 3) the Guinea fowl is capable of coping with the effects of dry weather conditions prevailing in the northern part of Ghana and the Sahelian ecological zones than other domestic poultry. This makes the environment in the Upper East Region most conducive for the rearing and production of the Guinea fowl. (Yildirim, 2012) indicated that the guinea fowl needs less water and survives under semi- intensive breeding around villages, their suitability to organic breeding and the increase in performance by improvement of genetic strain by selection, shows that the production of the animal can be prevalent and needed in the near future.

Nutritionally the meat is of high quality because it has high protein and less fat content and therefore is highly prized compared to the chicken meat. The nutritional qualities of the meat have made it a valuable component of the diet. It has 134 calories per 100 Grams which is second only to turkeys with 109 calories for the same quantity. The demand for the Guinea fowl meat and other products has been on the rise despite increases in the market prices for the meat of the bird. The flesh of the guinea fowl is tender with a good flavour. The demand for the eggs is high because of its gammy flavour and long shelf life.

Furthermore Kusina et al (2011) acknowledged that guinea fowl is globally recognised as an ideal vehicle that can be utilized to curtail poverty in the developing world

### **1.5. Problem Statement**

According to Wilson (2011, p. 17) the livestock subsector of the Ghanaian economy serves as a “safety net” to the small scale farmers in providing ready cash for emergency situations and contributes 7% to the agricultural component of the Gross Domestic Product (GDP). MoFA, (2011) annual reports indicates that 85% of households in the Upper East region are engaged directly in keeping of livestock’s including the rearing of guinea fowl on small scale basis for income and food. There is also a well-developed retail trade around the bird which has contributed to excellent prices for both the live and dressed birds in the upper east Region. There also exist a functional and an effective value chain around the guinea fowl production in the region with key operationalized actors in the value chain.

However despite these enormous contributions of the bird to the economy of the region and rural households, production continued to be on small scale under the traditional system of management is the dominant practice. This system of production encounters numerous problems such as incidence of diseases and intestinal parasites, inadequate quality feeding, unavailability of eggs for hatching all year round especially during the dry season. There is also slow growth rate of the local breeds and lack of improved genetic material resulting in low production. (Naandam et al. 2011, p. 253) this is further deepened by paucity of information on the traditional methods of production therefore hampering the development of the guinea fowl enterprise resulting in the producers operating on rudimentary levels. The government of Ghana under Accelerated Agricultural Growth and Development Strategy (AAGDS), and the Growth and Poverty Reduction Strategy (GPRS 11), the Food and Agricultural Organization (FAO) has released an amount of **Three Hundred and Fifty Thousand Dollars (US\$350, 000.00)** to support guinea fowl

production in the three Northern regions under the “Enhanced Guinea Fowl Production Programme”. In Furtherance of this, the guinea fowl farmers in the Upper East Region mobilised themselves together under the umbrella of “The Guinea Fowl Farmers Association” (GUIFFA) to engage and solicit the support of other service providers to facilitate increase production of the bird. The major problem encountered by the farmers is the level of production. The challenges of production were attributed to extension and research delivery on guinea fowl husbandry practices. A study conducted by Asombobilla (2011) in the northern Ghana observed that farmers in the region are strategizing to find reliable and suitable agricultural extension support due to the fact that Ministry of Food and Agriculture’s (MoFA) Agriculture Extension Services has difficulty fulfilling its mandate of reaching out to all smallholder farmers to improve agricultural production within the country due to low extension farmer ratios. In furtherance of this Amezah and Hesse (2002) confirmed that the national Extension Agent to Farmer ratio is 1:1,500 or more as a result of which MoFA is exploring the opportunity of promoting Public Private Participation in extension delivery. Similarly ISSER (2012) on the State of the Ghanaian economy indicates that whilst input sales outlets for crops increased countrywide from 1,177 in 2010 to 2,005 in 2011 livestock input outlets which are a major source of extension information to livestock farmers declined from 566 in 2010 to 194 in 2011 in the entire country. In the case of the Upper East Region there is only one registered veterinary input dealer in the regional capital. Development of appropriate extension intervention is the current suitable alternative to addressing the myriads of constraints of the guinea fowl farmers. It is against this background that this study sets out to investigate and assess the potential of extension delivery and how the processes of extension delivery could be used to improve guinea fowl production in the Upper East Region by the numerous small scale guinea fowl producers in the Upper East Region.

## **1.6 Research Questions**

In view of the problems of poor extension delivery as one of the key problems of guinea fowl production due mainly to low Extension Officer to farmer ratio and inadequate knowledge of Extension Agents on guinea fowl production the study seeks to answer the following research questions;

### **Main Research Question**

To what extent does potential of agricultural extension delivery affect guinea fowl production?

### **Sub Research Question**

1. Does the Extension Services providers adequate human resources to offer guinea fowl farmers knowledge and skills?

## **1.7 Hypothesis**

H<sub>01</sub>: There is no relationship between extension delivery and Guinea fowl production.

H<sub>02</sub>: There is no relationship between the knowledge and skills of Extension Agents and Guinea fowl production.

## **1.8 The Main Objective of the Study**

The main objective of the study is to assess the potential of extension delivery on guinea fowl production by small scale farmers in the Upper East region.

## **1.9 Specific Objectives of the Study**

The study therefore specifically seeks:

- 1) To determine the socio-economic characteristics of guinea fowl farmers
- 2) To determine the extent to which the potential of extension delivery can improve guinea fowl production.

- 3) To evaluate the knowledge and skills of Agricultural Extension Agents on guinea fowl production

### **1.10 Justification of the Study**

Though extensive research and studies have been conducted in this field most of their outcomes are donor centered leaving out the needs of the small scale farmers.

The outcome of this study will therefore highlight the real fortunes of extension delivery on increasing production of the Guinea fowl by the small scale farmers in the Upper East Region. Information generated from the study will guide the actors and service providers in the Guinea fowl value chain in streamlining their operations in order to reap the benefits of increased production of the Guinea fowl. The study will highlight the knowledge and skills of Extension Agents on Guinea fowl and this will guide the training institutions to re-align their curricula to meeting the needs of the small scale farmers who are the major clients of their trainees.

The study will also serve as the basis for further research into the problems affecting the production of Guinea fowl by farmers in the region in order to sustain increased production.

Furthermore the study will enhance the knowledge of actors and service providers on the Guinea fowl production. The study will guide the District/ Municipal Agricultural Development Units (M/DADUs) and the Non-governmental Organizations (NGOs) in designing extension packages on Guinea fowl production. The study will also serve as the basis for making recommendations on ways to improve extension delivery on Guinea fowl production.

### **1.11 The Scope of the Study**

The study links the small scale Guinea fowl farmers to extension delivery in a sustainable manner. It focuses on key areas of extension delivery that are of paramount importance to the guinea fowl production and other actors in the value chain that have the potential to contribute to improved production by the small scale farmers. The study emphasises the roles of extension delivery and how it can contribute to ensuring increased production of the Guinea fowl in the Upper East region.

## CHAPTER TWO

### CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

#### 2.0. Introduction

The purpose of this chapter is twofold, to set the theoretical basis for the research and secondly, to survey literature on extension delivery and how the processes of extension delivery could be used to improve guinea fowl production in the Upper East Region.

#### 2.1 Description of the Conceptual Framework

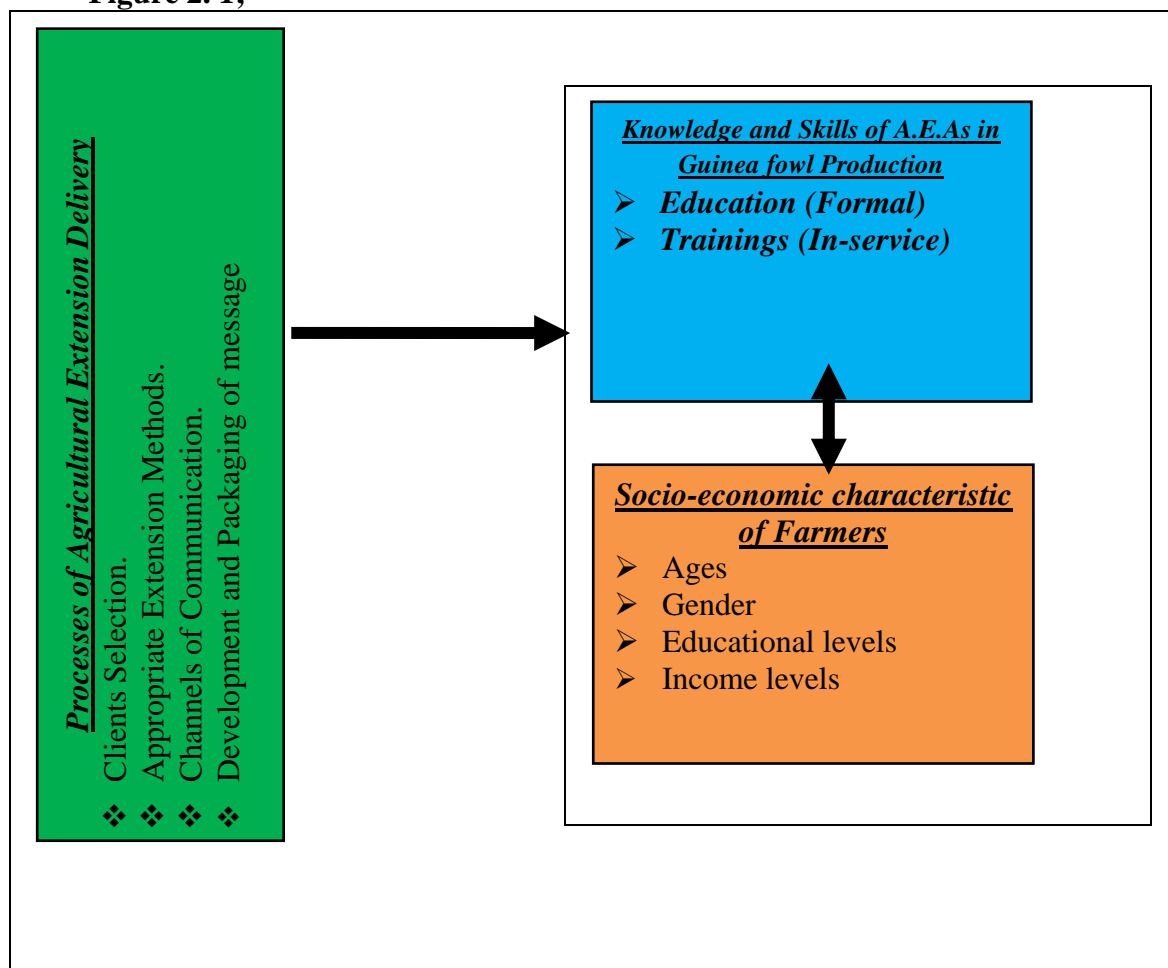
The conceptual Framework illustrates a coherent representation of the relationship among the factors linking the development of extension messages and technology development taking into consideration the knowledge of Extension Agents and the socio-economic characteristics of the extension clients. The conceptual framework helps in both defining the nature of the problem more clearly and preparing alternatives. According to OECD (2001, P3) the conceptual framework develops a normative foundation for defining and selecting competencies. It develops reference points for the development and understanding the indicators and provides appropriate interpretation of empirical results. The basic premise of the conceptual framework of the study is that through appropriate extension delivery, the small scale guinea fowl farmers can improve production. The key components of the framework are;

- 1) The concept of agricultural extension delivery
- 2) The socio-economic characteristics of the clients
- 3) The knowledge of Extension Agents in Guinea fowl production and

The conceptual framework provided the guide for the problem identification, project and client's selection and data collection processes. The study therefore seeks to establish a coherent relationship between the socio-economic

characteristics of guinea fowl farmers, extension delivery and improvement in production of the guinea fowl as illustrated in the figure 2. 1

**Figure 2. 1;**



The Conceptual Framework Source; Survey 2013



Direction of influence

## 2.2 LITERATURE REVIEW

### 2.2.1. Concept of Extension Delivery

Agricultural extension and advisory services play an important role in agricultural development and can contribute to improving the welfare of farmers and other people living in rural areas. According to Hugh et al (2010) agricultural extension delivery refers to the entire organizations that support services that facilitate people engaged in

agricultural production to solve farm problems. Agricultural extension can be organized and communicated in a variety of forms. The forms of delivery can contribute to productivity differentiated by increasing the speed of technology transfer to the clients and increasing farmers' knowledge by assisting them to improve the information flow from farmers to scientist. Also Bertrand, (2006) indicated that extension delivery involves a cycle which includes receiving input from stakeholders, development of programme, and implementation of the planned programme and evaluation through the use of appropriate extension methodologies and channels of communication. Additionally Asiedu-Darko (2013) indicated that the processes of extension delivery involves adequate consultation and involvement of farmers in the initial planning and development of technologies that are essential to the effective dissemination and adoption of farming technologies. Additionally the process describes the services of extension officers that provide rural people with access to knowledge and information they need to increase productivity and sustainability of life and livelihoods. It includes but not limited to the transfer of knowledge generated by agricultural research thereby contributing to meeting the food needs of people but contributes to conserving national resources and developing human and social capital (NRI, 2011).

For extension delivery to yield the desired results, farmers' need to participate in a schematic processes or stages referred to as the extension delivery chain. These stages as itemized by Gershon et al (2010) as the design of the extension programme, prioritization of the activities, provision of financial resources and inputs, delivery of service through interaction of extension agents with farmers which will result in performance and outcome of the activities. Effective extension delivery helps reduce the differential and actual yields in farmer's fields by accelerating technology transfer and helping farmers to become better managers, (Jock, et al, 2003) and plays the role of helping the research establishment tailor

technology to the agro-ecological and resource circumstance of farmers and facilitates both the adoption of technology and its adaptation to local conditions.

Glendenning et al (2010) indicated that the success of extension delivery depends on how it enhances the information flow along the agriculture value chain and whether it is done sustainably and effectively are determined by the type of information provided, how and to whom the information is provided, the strength of the feedback in each link and the capacity of the approach to provide relevant information to all the actors involved.

The delivery process is commonly identified with activities whereby Agricultural Extension Agents (AEAs) interact with and teach farmers improved farming practices, new technologies and more productive or efficiently packaged technologies. In the Ghanaian context MoFA (2008) agricultural extension delivery is a process that brings about changes in farmers through education and communication in farmers' attitude, knowledge and skills through dissemination of information, building the capacities of farmers through the use of a variety of communication methods that help farmers make informed decisions.

Although there is no single meaning of extension delivery, the common meaning underlying extension delivery focus on the processes of development of extension programme, using appropriate methods and channels to communicate the planned activities using appropriate channels facilitated by the organizations involved in implementation of the planned activities. These commonalities are the focus of the study and could be used for further interpretation.

In the discussion above key indicators of extension delivery is therefore hinged on the following variables:

### **2.2.2. Clients Selection.**

Extension clients refers to a heterogeneous group of people differentiated by their socio-economic factors, Definition of an appropriate extension clients is paramount for the success of extension delivery within the framework of policy strategies. According to Henning (2010) the framework for the definition of extension clients provides the boundaries for selecting from among the broader user categories, the specific groups which are to be targeted. The factors involved in client selection are the agro ecological zone, access to agricultural resources, gender, age and ethnic origin.

The framework provides the basis for selecting agricultural extension client categorize them into mostly small scale farmers, operating non-advised enterprises, using obsolete technologies, low value adding capacities therefore making production labour intensive.

### **2.2.3. Small-Scale farmers**

Many terms are used to refer to the small-scale farmers. Farming is generally dominated by small-scale producers who remain the main source of agricultural investment in many countries with around 500 million small-scale farmers supporting almost one third of global population (Billy Vorley et al, 2012).

According to Owusu Asante et al (2011) Ghana's agriculture predominantly consist of smallholder farmers, who constitute about 90% of farmers who are disadvantaged in accessing certain information such as access to credit and other inputs relevant to their production, processing and marketing activities. The small scale farmers in developing countries are considered to be more efficient given the level playing field, than the large scale farmers. This has been established empirically in Asia, Latin America and Africa

taking into consideration the issue of economies of scale as the underlying themes (Kirsten et al, 1998)

In the view of Thompson et al (2008) increased access to production services like agricultural extension, credit and market by small-scale farmers will be pivotal in reversing the decline in food production. Furthermore according to Barbara (2012) incomes generated from scale farmers are generally low and most farm households earn less than 25% of household expenditure from farming activities. Risk and uncertainties in the sector makes the small-scale farming unattractive to lending institutions. Furthermore complications associated with tenure and availability of agricultural risk increase also militate against access to credit.

#### **2.2.4. Extension Methods.**

Extension work is realised in several methods. These include individual, group and mass extension methods as postulated by Zivkovic et al (2009 p. 6) the individual method represents intensive method of extensive work and is applied in the form of house visits and advisory discussion, practical demonstration and farmers visiting extension office. The group method provide relatively broad spectrum of influence such as expert lectures, group discussion and field days. The mass media involves the use of newspapers, leaflets radio, expert brochures and news articles for informing and educating large groups of agricultural producers within the same time frame. None of these methods can be singled out as the best method as all of them have their advantages and disadvantages.

According to Anandajayasekeran et al (2008) the choice of a particular method therefore depends on various factors such as community organization and resources available for extension agents. Thus a combination of methods is more effective than just one method.

In the view of Ali-Olubandwa, et al (2011) some extension methods are cost effective than others because when farmers are taught in groups, it reduces extra cost incurred by extension organizations in acquiring extra material for individual.

Extension method is therefore a devices used to create situations in which new information can pass freely between the extension worker and the farming communities. The extension-teaching methods is also explained as tools and techniques used to create situations in which communication can take place between the rural people and the extension workers. They are the methods of extending new knowledge and skills to the rural people by drawing their attention towards them, arousing their interest and helping them to have a successful experience of the new practice. It is the function of the extension worker to use the extension methods which provide opportunities for rural people to learn and stimulate mental and physical activities among the people.

#### **2.2.5. Channels of Extension Delivery**

According Raabe (2008) the ability of farmers to participate in technology development depends on the existence of effective communication channels between farmers, research and extension agents of which ensures communication of farmers' problems as well as research solutions. Moore et al (nd, p. 36). The major interest of instructional designers is to communicate simultaneously and effectively using audio-visual and visual stimuli and this is made based on the amount and types of information that can be processed and assessed.

Chapman et al (2003) singled out the radio as a powerful communication tool in extension because of its potential for agricultural extension reach and the relevance that local broadcasting have by using participatory communication approaches to share information locally and opening up wide information networks.

Some channels are hindered by enormous information loss due to the uptake of technologies in the rural areas, amidst changes facing extension, there is the growing concern that farmers and members of rural communities have needs for information and appropriate learning methods that are not being met (Don, 2006). Farmers require a diverse range of information to support their farming enterprises on best practices and technology which the public extension system provides. Glendenning, et al (2010, p. 3) farmers require information that relates to:

- ✓ The most appropriate technological options
- ✓ Sourcing reputable input suppliers
- ✓ Collective action with other farmers
- ✓ Consumer and market demands for product
- ✓ Quality specific for produce

Channel of communication refers to the medium or passage through which information is sent from one point to another usually from Extension Agent to the farmer or vice versa. Depending on the communication setting, a channel may be a piece of equipment. Some channels of communication in Agricultural extension are radio, internet, books, mobile phones, and posters, a person, an event, activity or natural resource such as air currents

#### **2.2.6. Extension Programme Development.**

Developing appropriate extension content is critical to the extension process. The performance of extension depends to a large extent on the appropriateness of its messages. An appropriate extension message is situation driven because what is appropriate to one client may not be suitable to another farmer operating in the same ecological zone. According to Neda et al (2010) programme development is a deliberate process through

which extension agents are involved in designing, implementing, and evaluating programme that address needs of the clients they satisfy. The processes of programme development are continuous and inter-related and also facilitate technology development. Extension programme development is an ongoing process of accessing farmers' needs and selecting appropriate content and method in programme delivery. The process of extension programme development involves:

1. Analysis of situation or context
2. Setting objectives
3. Design of action plan
4. Implementation and
5. Evaluation of input, output, outcomes and impacts.

The programme becomes the vehicle for communicating with stakeholders and collaborators about the outputs and outcomes as well as the choices to be made involving the setting of initial course of actions (Gibeon, 2001).

Extension programme development in this study refers to a continuous series of processes which includes planning a programme, preparing a plan of work and teaching plan, taking action to carry out the plans and determining and reporting accomplishments. It is an intensive and broad effort on the part of the extension service to assist farmers to analyze their major problems and to build an educational programme directed toward the improvement of agriculture, the family and community living. Programme development is both an educational process and an attempt to do a thorough and systematic job of long-range programming with the people. Programme planning is the process of making decisions about the direction and intensity of extension-education efforts to bring about social, economic and technological changes.

### **2.2.7. Extension Support Institutions**

Support institutions are made up of a large number of varying actors. The structure of the support institutions vary but are known to provide services which are essential to effective agricultural extension work. The basic agricultural support institutions are research, agricultural education and farmers training centres, agricultural credit sources, marketing systems for purchasing input and selling agricultural produce. According to Daku (1997, p. 37) these support institutions provide advice: information and other support services to farmers to enable them improve their farm and non-farming incomes as well as contribute to private sector participation in extension delivery. In the view of Adebayo (2004, p. 7) these support institutions play the role of building capacities and enabling farmers to operate in the innovation system by acting as an intermediary organization or a body that acts between two or more parties. Such intermediary activities include: helping to provide information about potential collaborators, helping find advice, funding and support for the innovation outcomes. (Glendenningen et al, 2010. p. 8).

## **2.3. GUINEA FOWL (*NUMIDA MELEAGRIS*) PRODUCTION**

### **2.3.1. Origin of the Guinea Fowl**

The Guinea fowl is descended from the wild species of the bird in Africa. The fowls derive their name from Guinea, part of the west coast of Africa. The species (*Numida meleagris*) are indigenous to Africa and is widely reared in Ghana and other African countries. Europe dominates industrial guinea fowl production with France as the leading producer worldwide. Production is beginning to increase all over the world. Morecki (2012) stated that the guinea fowl is descended from the wild species of Africa and derive their name from Guinea part of the west coast of Africa from where they derived their name but were sent to Europe during the middle ages. The helmet guinea fowl-fowl, *Numidea meleagris* is part of native fauna of West Africa and distributed from Senegambia to Cameron and

Western Zaire. (Now Democratic Republic of Congo). The bird is extensively reared in the Ghana for economic and socio-cultural reasons.

### **2.3.2. Guinea Fowl Management Systems**

According to Saina, et al (2005) the Guinea fowl management systems in Ghana and in Africa in general is classified into three systems. The classification is based on the flock size, productive inputs and output relations. The basis of the classification is varied and access and availability to the three factors of production as capital, land and labour play a significant role in this classification. The systems practiced in Ghana are;

#### ***1. The Extensive System (Free Range)***

This is the most common and suitable form of management for farmers with a lot of land and field for pasture and is also referred to as the free range system by Morecki (2012) in this system the bird find their own food and shelter and therefore is almost kept at no cost to the farmer. In the extensive system the farmer keeps different species of poultry such as the Guinea fowl, chicken, ducks, and turkeys. The system is mostly carried out by small scale farmers in the rural areas where land is mostly available for the birds to roam and feed themselves. Under the extensive system the birds are exposed to the extremes of the weather which often result in heavy losses by predators, parasites infection and diseases. Improvement in the extensive system is of economic importance as it involves the entire rural population. Modifications which can improve the extensive system include provision of water at the disposal of the birds and catering for health.

#### ***2. The Semi-intensive System***

The semi intensive system is characterised by use of minimum inputs with the birds scavenging. Investment in this system does not go beyond acquisition of foundation stock. Usually a handful of grain is given each day. The system includes provision of

permanent housing. The birds are provided supplementary feeding and water within the houses. The stocking density of up to 500 birds per acre is kept (Ikani and Dwafang 2004). Diseases are controlled to enhance to enhance productivity. The semi-intensive management system allows the birds to get as much as they can from the environment in the form of feed.

### **3. *The Intensive System***

The system is used commercially and involves confining the birds indoors either in battery cages or on deep litter within large controlled environment. Food and water requirement are made available all the time. This system of Guinea fowl production is based on specialised breeds. This is not normally done as far as the local breeds of Guinea fowl production is concern. Standard Management practices such as appropriate housing, feeding and disease control programme are followed

#### **2.3.3. Breeds of Guinea Fowls**

Many species of the Guinea fowl are found but the common domesticated ones are descended from the species *Numidea meleagris*. They live in the grass land areas spreading from derived Savannah to the Northern Guinea savannah vegetation zone. The *Numidea meleagris* usually utilizes branches of trees for roosting in the night and as a place of escape from natural enemies. (Ikani and Dwafang, 2004 p. 4)

According to Agbolosu et al (2012) the common species of the bird found in Northern Ghana and are extensively managed in the Upper East, Upper West and the Northern regions. The three common species are the Pearl, Lavender and the White varieties are the common domesticated breeds. Commonest characteristic among the three varieties is the possession of bare neck and the presence of wattles.

1. The pearl variety is the most popular and typically the one that people recognize the most. They have purplish-grey plumage with dots of white spots giving them the look of pearls. The bird looks so handsome that the feathers are often used for ornamental purposes.

2. The next most common variety is the white Guinea fowl (also called African White). As the name indicates, the white Guinea has pure-white feathers. In addition, its skin is lighter than the other two varieties. These birds are not albino and are the only solid white bird that hatches solid white and not yellow. The bird looks attractive and so the feathers are used for beatification because of their aesthetic values. The White variety, as the name suggest has pure white plumage with lighter skin colour than the pearl type. According to Teye and Adam (2011). This breed is used for religious and other spiritual performances.

3. Lavender Guineas are similar to the Pearl, but their plumage is light gray or lavender dotted with white spots. The Lavender variety resembles the pearl but has light gray plumage or lavender colouration frequently dotted with white markings. According to Naandam and Issah (2011) it is the preferred choice of most Guinea fowl farmers because of its hardiness which makes it resistance to common diseases of the bird. It is a common practice to observe the three breeds mixed in a single flock in any community where Guinea fowl is extensively reared. The extensive system allow the different breeds to crossbreeding resulting in the presence of multiple breeds in a single flock

#### **2.3.4. Characteristics of the Guinea fowls**

A research conducted in Nigeria by Amadu Bello University in 2004 cited the benefits of keeping Guinea fowl to include its freedom from poultry diseases, has tender meat with fine flavour, the eggs command premium price due to better storage ability and also used for scientific research purposes by philosophers. Jacquie et al (2011) indicated that the reason for which farmers keep Guinea fowl includes for sale, as a source of income, serves

as farm yard “watch dog”, insect and rodent control, and snakes control and for their unique ornamental value.

The general characteristics that are common to all the breeds of the Guinea fowl found in Northern Ghana according to Morecki (2012) include;

- Having a bare neck and head with some wattles with those of the males much larger and brighter than the females
- The Guinea fowl exhibits both social but timid behaviours. This attitude can result in panic among flock. During the early stage of growth this behaviour can cause the flock to crowd and this can result in fatality.
- The birds are very noisy and residential areas should be avoided in keeping large chicks of Guinea fowls.
- They are grazers and can cause economic damage to cultivated crops when the birds are left on free range. The bird does not use scratch the surface of the soil with its feet but rather uses its claws to graze.
- The bird is resistant to heat than most species of poultry and therefore requires higher temperatures in raising it.

Some features that also make the bird adapted to its environment are that;

- It is a hardy bird
- It is resistant to many of the common poultry diseases
- Rearing Guinea fowl does not require expensive and elaborate housing.
- It has good grazing abilities
- The bird has the ability to tolerate mycotoxin and aflatoxin
- The meat is rich in vitamins and free of cholesterol
- The bird also have excellent eye sight (Happyson, 2005)

### **2.3.5. Selection of Foundation Stock**

One of the critical and first most important decisions to be made by the starting Guinea fowl farmer is the selection of the foundation. Ikani and Dwafang (2004) stated that the foundation stock are acquired from reliable and renowned farmers in the locality. Some basic characteristics to guide in the acquisition of day old keets are steady legs, alert eyes and a healthy looking with no physical defects.

### **2.3.6. Sex Determination**

A major problem in the Guinea production is the determination of sex especially in the first 7 weeks of the young Guinea fowl life. Due to the problems of sex determination farmers who are inexperienced in management of Guinea fowl may unknowingly keep one sex stock as the breeding stock. Sex may be distinguished after the birds are 2 months or older. The male and female Guinea are so similar in appearance that it is almost impossible to distinguish them from each other. The adult male according to Morecki (2004) has a slightly larger helmet and wattles and coarser heard than the females. The female usually emits a two syllable sound whilst the males make a one-syllable sound. On the other hand both the male and female emit one-syllable cries when in danger but the male never makes a two syllable sound.

### **2.3.7. Egg Incubation**

The Guinea hens according to Ikani and Dwafang (2004) are not particularly good mothers even though they are good layers. They lay an average of hundred eggs compared to the local hen which lays 24 eggs annually. Eggs are naturally hatched by the broody hen naturally or artificially using incubators.

### ***1. Naturally incubation***

For the backyard guinea fowl farmer, the chicken is allowed to sit on a number of eggs depending on her size and ability to cover the eggs effectively with her wings. The incubation period of the guinea fowl eggs takes 26-28 days. (Naandam and Issah, 2011 p. 253). The natural incubation method is commonly used by farmers with small flocks. The chicken hens are used because they are most adaptable to sitting on the eggs than the guinea fowls. 18 to 25 eggs may be set under an incubating chicken hen, duck or a turkey. According to Sonaiya and Swan (2004 p. 37). In the natural brooding, healthy hens that are preferably vaccinated with good brooding and mothering record are usually used. Signs of broodiness that should be used in setting eggs are that the hen stops laying, remains sitting on her eggs, ruffles her feathers, spread her wings and makes distinctive chucking sound.

### ***2. Artificial Incubation.***

Artificial incubators are of different types with in-built devices for the control of temperature, humidity, and turning of eggs.

#### **2.3.8. Diseases and Pests of Guinea fowl.**

Moreki (2012) documented that, the domestication of the guinea fowl have not yet been fully implemented so they have the hardiness of their wild relations. They do not suffer from many pests and diseases as the fully domesticated chicken such as New castle Disease (NCD)

There are many diseases associated with poultry production however with the Guinea fowl the bird has natural resistant's to parasitic infestation. With high stocking density on large farms the incidence of diseases could be noticed in a flock if the attendant is experienced

enough. Ikani and Dwafang (2004) identified *heterakis species* as the major parasites infecting the Guinea fowl with *Eimeria spp* as the most intestinal protozoan's parasites causing mortality in the bird.

## **CHAPTER THREE**

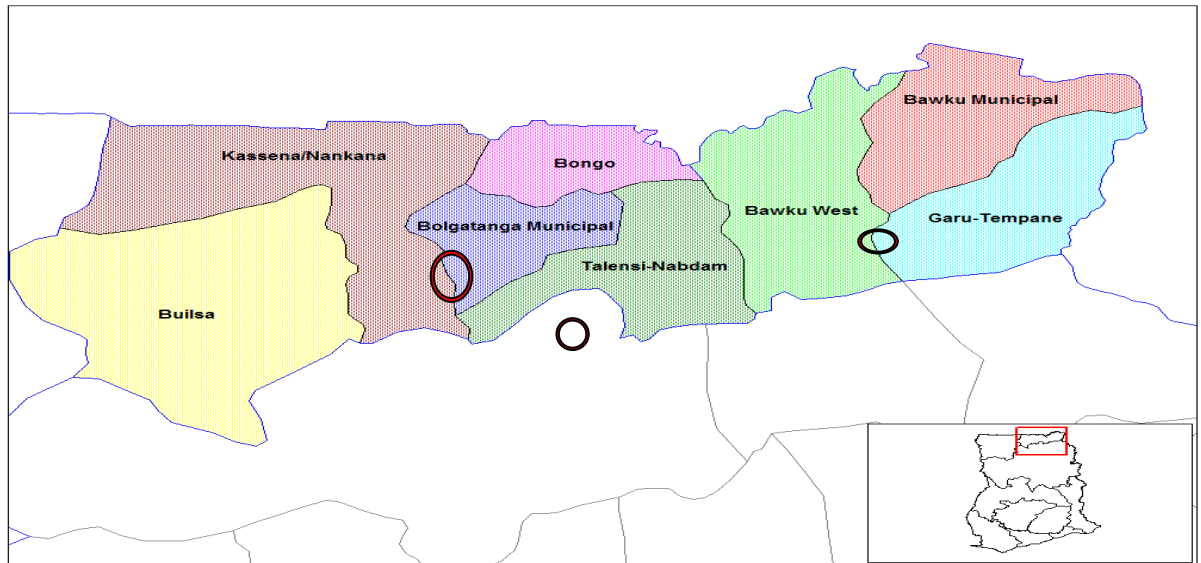
### **METHODOLOGY**

#### **3.0. Introduction**

This chapter describes the methodology of the study. It covers aspects such as the research design, population, sampling technique and sample size, data collection methods and instruments, field data collection and management. The process itself covered preparatory, field data collection and data analysis. The field data collection instrument was designed to capture information from selected communities in three districts in the Upper East Region from guinea fowl farmers

#### **3.1 The Study Area**

The Upper East Region is located in the north-eastern corner of Ghana and is located between longitude 00 and 10 West and latitudes 100 30''N and 110 N. It is bordered to the north by Burkina Faso, the east by the Republic of Togo, the west by Sissala East district in the Upper West Region and the south by West Mamprusi district in Northern Region (Figure 2). The land is relatively flat with a few hills to the East and southeast. The total land area is about 8,842 sq km, which translates into 2.7 per cent of the total land area of the country



**Figure 2: The Map of the Upper East Region Showing the study Districts**

### **3.1.1. Soil and Drainage**

The region's soil is "upland soil" mainly developed from granite rocks. It is shallow and low in soil fertility, weak with low organic matter content, and predominantly coarse textured. Valley areas have soils ranging from sandy loams to salty clays. They have higher natural fertility but are more difficult to till and are prone to seasonal water logging and floods. Drainage is mainly by the White, Red Volta and Sissili Rivers.

### **3.1.2 Vegetation**

The natural vegetation is that of the savannah woodland characterized by short scattered drought-resistant trees and grass that gets burnt by bushfire or scorched by the sun during the long dry season. Human interference with ecology is significant, resulting in near semi-arid conditions. The most common economic fruit trees are the shea nut, dawadawa, baobab, the neem and acacia.

### **3.1.3 Climate**

The climate is characterized by one rainy season from May/June to September/October. The mean annual rainfall during this period is between 800 mm and 1.100 mm. The rainfall is erratic spatially in duration. There is a long spell of dry season from November to mid-February, characterized by cold, dry and dusty harmattan winds. Temperatures during this period can be as low as 19° C at night, but can go to more than 35° C during the daytime. Humidity is, however, very low making the daytime high temperature uncomfortable and irritating to the skin. The region is entirely within the “Meningitis Belt” of Africa. It is also within the onchocerciasis zone, but with the control of the disease, large areas of previously abandoned farmlands have been declared suitable for settlement and farming.

### **3.1.4 Major Crops**

The main crops of the people in the area are millet, guinea-corn, maize, groundnut, beans, sorghum and tomatoes and onions are cultivated during the dry season. These crops are mostly grown under rain-fed agriculture. Vegetables cultivation is very high in the region purely as an economic activity mainly under irrigation using both large and small scale irrigation facilities located in Navrongo in the Kassena Nankana West District and Vea in the Bongo district. The major vegetables cultivated in the region are tomatoes, onions, pepper, okro, water melon.

### **3.1.5 Livestock**

The Upper East Region has the potential to support commercial livestock production by virtue of large expanse of grass land bordering the Upper West region. Production of indigenous chicken especially the guinea fowl, the local hens, and ruminant production are also on the ascendancy.

### **3.1.6 Demographic Characteristics**

The Upper East region has population 1,046,545 (2010 PHC), which is less than one twentieth (4.2%) of the national population. The population is made up of 51.6% female and 48.4% male. The inter censual growth rate of 1.1 per cent per annum is slightly below one-half the national growth rate of 2.7 per cent and is the lowest regional growth rate recorded. The region has a population density of 104 persons per square kilometre is higher than the national density of 79.3 persons per square kilometre and ranks fifth in terms of population density in the country.

### **3.2 Research Design**

According to Wolf (1990), a research design is a way of proceeding through the research process by breaking the process down into logical steps each can be designed more effectively. The step by step process are definition of the research objectives, conduct preliminary research, design the formal definition of research objectives, conduct preliminary research, design the formal research, do field work and analyse the data. Additionally Gordon and Mariam (2007, p. 61) indicated that a research design is closely allied to statistical analysis of data for sound reasons.

This study was conducted using a survey research design. Glasgow (2005) identified three distinguishing characteristics of a survey research. These include the collection of data required for the survey research from people and selected population from which final findings can be generalized back to the population.

The survey design is appropriate for this study because the study sought to investigate certain characteristics and issues about a specific group of peoples (guinea fowl farmers) within a specific geographical area. The study sought to assess the potential of extension delivery on Guinea fowl Production in the Upper East region. The function of the research

design is to ensure that the evidence obtained from the survey enables the researcher to answer the initial question as unambiguously as possible.

A field survey was used in this study. The Variables in the study were observed and measured in their natural setting without any control treatment.

### **3.2.1 Population of the Study**

According to Donald et al (2006) a population of the research study consist of the subjects one want to study. It comprises all the possible cases that constitute a known whole. It also refers to all individuals or units of interest and everything you want measure.

In the case of this study the population is made up of:

1. Guinea fowl farmers in the Upper East region
2. Other actors such as Agricultural Extension Agents and veterinarian
3. Input dealers
4. Extension service providers who deal with the Guinea fowl farmers through the provision of advisory services.

### **3.2.2. Sampling Procedures' and Sample Size**

A sample is defined as the portion of the total population and it must always be considered as an approximation of the whole population. According to Kick (2006 p.2) sampling is the process of selecting a study in such a way that the individuals represents the larger group from which they were selected. This representative of the population is the sample. There are different techniques of selecting a sample for a study. A sampling technique therefore refers to the author's method of selecting the type, size and representation of the sample.

The Upper East Region is made up twelve administration districts and municipalities. Three districts were purposively selected from the total number of districts based on the performance of the guinea fowl farmers and their production levels in the selected districts

and municipalities with high potential were considered for the study. The indicators were based on the number of farmers producing guinea fowls and the availability of large commercial market and other collaborating partners facilitating the production processes for the choice. The study also considered the geographic representation of the region which made up of three zones namely:

1. Eastern Corridor: This zone is made up of Bawku municipal Assembly, Bawku West, Garu -Tempane , Pusiga and Binduri Districts
2. The Central Zone: This zone represents the central portion of the region and is made up Bolgatanga Municipality, Bongo, Nabdam and Talensi Districts
3. The Western Corridor: The zone is made of districts to the western corner of the region and these are Kassena Nankana West (KNWD), Kassena Nankana East (KNED). Builsa South and Builsa Districts.

The researcher purposively selected Bolgatanga municipality, Kassena Nankana West and Bawku West district as indicated in the map of the study area. Again four communities were selected in each of the target districts and the list of Guinea fowl farmers obtained from the Guinea Fowl Farmers Association (GUIFFA). The subject of the study is made up of a sample size of 120 small scale Guinea fowl farmers. The table below is a multi-stage sampling process and outcomes

### 3.2.3 Multi-stage sampling process.

**Table 3.1 Multi-stage sampling process.**

Zone	Districts	Sampled District	Community	Number of Farmers sampled
Eastern Corridor	Bawku Municipality	Bawku West District	Tilli	10
	Garu-tempani		Zebilla	10
	Bawku West		Kobore	10
	Pusiga		Sapluga	10
	Binduri		Saka	
Central Zone	Bolgatanga Municipality	Bolgatanga	Zaare	10
	Bongo		Nyariga	10
	Nabdam		Sumbrungu	10
	Talensi		Gambibgo	10
Western Corridor	KNWD	Kassena	Kandiga	10
	KNED	Nankana	Akurugu daboo	10
	Builsa	West District	Sirigu	10
	Builsa North			10
<b>TOTAL</b>		<b>4</b>	<b>12</b>	<b>120</b>

*Source: Survey data 2013*

### 3.2.4 Quantitative and qualitative Data

Both qualitative and quantitative data were collected and used for the study. Wendy (2004) emphasized the importance of using both qualitative and quantitative data by emphasizing that mixed methods is helpful so that diverse viewpoints or standpoints cast light on the topic by helping in validating claims that might arise from the initial pilot study. In this study triangulation is used to collect both qualitative and quantitative data. Hence qualitative data in the form of description and observations were collected with the use of semi-structured questionnaires which allowed interviewees to give additional information and describe processes and issues were also used. Also quantitative data in the form of

measures of quantities, figures and numbers were collected from the respondent using the survey instrument

### **3.2.5 Questionnaire Design and Pre-testing**

Pre-test of the survey instrument serves as the live test of the survey and is also the last step in finalizing the survey questions and form one of the critical steps in the administration of the data (Brace, 2004). It is also a simulation of the survey implementation carried out on a small scale with members of your target population.

The interview was based on a questionnaire that consists of two distinct groupings of open ended and close ended questions. The interview approach was informal and conversational. The questionnaire was pre-tested with the executive of the guinea fowl Farmers Association (GUIFFA) in the Bolgatanga Municipality to assess the strength and weakness of the survey instrument. Modifications were made to improve and clarify the instrument.

### **3.2.6 Data collection**

The study made use of a variety of data collection techniques and sources of information including both primary and secondary data sources. For the primary data a questionnaire was administered by the researcher. Focus groups discussions were also held with other MoFA and NGOs staff and key informants in the communities and the districts to corroborate and clarify some of the issues in the interview schedule. Farms of some prominent Guinea fowl farmers were visited to interact with the farmers and to observe some of their production techniques and practices which could contribute to improved guinea fowl production in the Upper East region.

Secondary data were gathered from both published and unpublished sources such as journals, articles, books, official reports of some actors and service providers. This was to

supplement the primary data and to improve the quality of the data collected and help provide explanations to some of the information from the primary data.

### **3.2.7 Data Management**

Data management involves coding and summarizing of responses to ensure that all the topics in the interview guide are relevant to the study that have been covered.

#### **3.2.3 Coding and Summarizing of data**

The researcher developed a coding frame using the various topics under which information was obtained. Values were assigned to the codes. For open ended questions each script was then picked and read and the various responses recorded in the appropriate code. This is continued till all the 120 responses in the questionnaires were categorised. The same responses in each category were countered. The responses were then summarized and frequency tables were also shown where applicable.

### **3.2.8 Data Analysis**

Data collected was analysed using the statistical programme SPSS Version 16.0. The results of both qualitative and quantitative analysis of the data have been presented using charts, percentages, columns chart to determine quantities and relationships. The data was analysed by the researcher using Statistical Procedures' for Social Scientist (SPSS) software. Descriptive statistics such as frequencies and percentages were used for the analysis. Key informants such as services providers and actors in the Guinea fowl value chain were consulted and their input elicited in order to triangulate and validate the findings as well aid in the qualitative analysis. The qualitative data was analysed by organizing fora with key actors in the guinea fowl industry in the Upper East region such key informants which are supported with literature review.

### 3.2.9 Quantitative and Qualitative Research

The research design for the study allows for the use of both qualitative research methods in data collection. Edmunds et al (2010) defines qualitative research as a type of educational research in which the researcher decides what to study, ask specific questions, collects data from participants, analyzes these numbers using statistics and conducts the enquiry in an unbiased, objective manner. It is applied in a wide variety of natural and social sciences including physics, psychology, sociology, and geology. A quantitative methodology can then be described as the process of explaining phenomena by collecting numerical data that are analysed using mathematical methods.

Qualitative research is a particular tradition in social sciences that fundamentally depends on watching people in their own territory and interacting with them in their own language on their own terms. Qualitative research has been seen to be “naturalistic”, “ethnographic” and “participatory” (Kirk and Miller, 1989). The main strength of qualitative data collection are that it provides rich and detailed information about affected population, perspectives of social and cultural context, inclusion of diverse and representative cross section of affected persons, in depth analysis of impact of emergency, data collection process which requires limited number of respondents and the data collection process can be carried out with limited resources (ACAPS, 2012). Qualitative research is a type of scientific research that seeks to answer a question, systematically uses a predetermined set of procedures to answer the question, collect evidence from the respondents and validates unclear issues from key informants culminating in the production of findings that were not determined in advance and are applicable beyond the immediate boundaries of the study. Qualitative research is concerned with developing explanations of social phenomena that it aims to help us understand the world in which we live and why things are the way they are.

The respondents were supportive in providing and explaining some of the variables the study seeks to investigate

### 3.2.10 Concepts, Information and Sources of Information

**Table 3.2 Concepts, information and Sources information**

<b>Concepts of the study</b>	<b>Information Required</b>	<b>Sources Of Information</b>	<b>Methods Of Data Collection</b>
Socio-economic characteristic of Guinea fowl farmers	1. Ages of farmers 2. Gender 3. Level of education 4. Income levels 5..Management systems	Guinea fowl farmers	Interview checklist  Questionnaire
Extension Delivery	1. Main Extension Activities 2. Extension Methods 3. Contact between AEAs and farmers 4. Channels of Communication 5.Extension Service Providers	Guinea fowl Farmers A.E. As MoFA NGOs working with Guinea fowl farmers	Group discussion  PRA  Key informants Interview
A.E.As Knowledge on Guinea fowl Production	1 Demographic Characteristics of Extension Staff 2. Extension Officer Farmer ratio 3.AEAs Knowledge on Guinea fowl production 6. Training Needs assessment of AEAs.	Secondary sources  A. E. As  MoFA DDA/MISO	Group discussion   PRA  Key informants

*Source: Field Study 2013*

## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### 4.0 Introduction.

This chapter presents the results of the study in a form that will enhance the attainment of the objectives of the study. The chapter seeks to achieve the objective of the study which is to assess the potential of extension delivery on guinea fowl production by small scale farmers in the Upper East Region by analysing the roles of the small scale farmers and the Agricultural Extension Agents. This section provides a vivid analysis and discussion of the findings in respect of:

- Socio-Economic Characteristics of Guinea fowl farmers
- The process of Extension Delivery (From the conceptual framework)
- Knowledge of Agricultural Extension Agents on Guinea fowl Production.

#### 4.1 Socio-Economic Characteristics of Respondent Farmers

According to Rehman et al, (2013) farmers' access to agricultural information is an important variable, which may be influenced positively or negatively by their socio-economic characteristics such as age, educational level, size of land holdings, income levels, and their technology adoption. The personal characteristics of the respondents considered are gender, ages, level education incomes and the management systems practiced by the farmers may influence the farmer's participation in extension activities, preference for a particular methodology and channels of communication. The socio-economic characteristics of farmers exert their influence on the attitude and behaviour of farmers

#### 4.1.1 Gender of Respondent farmers

The survey reveals that out of a total of 120 respondents, 91 (77%) were males and 29 (23%) were females. Women involvement in Guinea fowl production is low due to the fact the domestic roles of females which are usually carried out in the morning and late afternoon are peak times of managing Guinea fowls especially the keets. Producing Guinea fowl is time consuming and this discourages most women from venturing into the sector

**Table 4.1: Distribution of the sexes of respondent farmers**

<b>Gender</b>	<b>Frequency</b>	<b>Percent</b>
Male	91	77%
Female	29	23%
<b>Total</b>	<b>120</b>	<b>100%</b>

*Source; Survey data 2013*

#### 4.1.2 Age of respondent farmers

The study found that the age of respondents was between 20 and 59 years. Most of the respondents were age less than 50 years with the mean age of 38.6 years. Generally majority of the respondents 'are youthful, that is they are aged between 20 and 50 years (77%) with the just (23%) above 50 years old as illustrated in table 4.2. The implication of the age distribution is that the Guinea fowl farmers are mostly youthful. These categories of farmers are known to be enterprising and therefore could undertake the guinea fowl production as business venture. They could also obtain extension information from AEAs could also source and adopt technologies from diverse sources of for their activities.

**Table 4.2: Ages distribution of respondents**

<b>Age (In Years)</b>	<b>Frequency</b>	<b>Percentage</b>
20-29	22	18%
30-39	32	22%
40-49	44	37%
50-59	22	16%
<b>Total</b>	<b>120</b>	<b>100%</b>

*Source: Survey data 2013*

#### **4.1.3 Educational Level of Respondents**

Majority of the respondents had formal education. The survey found that 45% of the respondent had no formal education. Of the number that had formal education 46 (40%) had basic, 11 (9%) attended SSS and 8 (6%) attended tertiary education.

The findings suggest that the educational status of the respondents is very low and this could influence their participants in extension programmes as well as understanding of issues and their information search behaviour. This is because education can and does affect the way people think and solve problems as it provides the skills for record keeping and with tools to accept positive changes. The low literacy levels of the respondents could influence their technology adoption and information search behaviour.

**Table 4.3: Distribution of educational status of respondent farmers**

<b>Level of Education</b>	<b>Frequency</b>	<b>Percent</b>
Nil	50	45%
Basic	46	40%
SSS	11	9%
Tertiary	8	6%
<b>Total</b>	<b>120</b>	<b>100%</b>

*Source: Survey data 2013*

#### **4.1.4 Levels of Income**

The study found that 55% of the respondents earned GH¢500.00 or less in a year. A further 36.7% (44) of the respondents earned between GH¢501.00 and GH¢1000.00 per annum and only 7.5% or 9 of the respondents received over GH¢1000.00 per annum. Cumulatively 92.2% of the respondents earned less than GH¢1000.00.

The study observes that the incomes levels of the respondents are generally low due generally to low economic activities in the area. The low level of farmer's income could further affect their ability to procure inputs for expansion of their operation as well as influence their adoption of improved technologies.

#### **Table 4.4 Distribution of Income Level of guinea fowl farmers**

The study found that 55% of the respondents earned GH¢500.00 or less in a year. A further 36.7% (44) of the respondents earned between GH¢501.00 and GH¢1000.00 per annum and only 7.5% or 9 of the respondents received over GH¢1000.00 per annum. Cumulatively 92.2% of the respondents earned less than GH¢1000.00.

The study observes that the incomes levels of the respondents are generally low due generally to low economic activities in the area. The low level of farmer's income could

further affect their ability to procure inputs for expansion of their operation as well as influence their adoption of improved technologies

<b>Level/ Annum</b>	<b>Freq.</b>	<b>%</b>
GH¢500.00 or less	67	55.8
GH¢500.00 to GH¢1000.00	44	36.7
More than GH¢1000.00	9	7.5
<b>Total</b>	<b>120</b>	<b>100</b>

*Source: Survey data 2013*

#### **4.1.5. Management Systems of the Small Scale Farmers**

The table 4.6 is an illustration of the management systems of the small scale guinea fowl farmers in the Upper east region. The management systems of producing guinea fowl are classified into the extensive (Free range), the semi intensive and intensive systems. Table 4.6 shows that majority 64.2% (77) of guinea fowl farmers adopt the extensive (Free Range) system of production whereas 34.2% of the respondents adopts the semi-intensive management system and only 1.2% (2) of the respondents practices the intensive system of management. The findings reveals that the farmer's choice of a particular management system could be based on availability of land and other resources such feed and medication as well as the income level of the farmers. Wealthier farmers are able to afford extra resources to purchase input and thus improve their management system. In situations where land is cheap and majority of the farmers adopt the free range system of management though is associated with high losses through theft, predators, disease and pests. Dei et al, (2009) confirmed that the extensive system account for 63% of 80% keet mortalities in Guinea fowl production due to poor nutrition, exposure to weather, diseases and pests and theses challenges can be addressed by adopting the intensive management system.

**Table 4.5. The Management System of Small Scale Guinea fowl Farmers**

<b>System of Management</b>	<b>Frequency</b>	<b>Percent</b>
Extensive (Free Range)	77	64.2
Semi-intensive system	41	34.2
Intensive	2	1.6
<b>Total</b>	<b>120</b>	<b>100%</b>

*Source: Survey data 2013*

## **4.2. Extension Delivery**

Extension delivery is key to improving the economic fortunes of the small scale farmers in the rural areas. According to Asiedu-Darko (2013) agricultural extension delivery requires adequate consultation and involvement of farmers in the initial planning and development of appropriate technologies and efforts that facilitate their effective dissemination and adoption by the farming communities. The study captures aspect of extension delivery such as client's involvement in planning and involvement in the implementation of the planned activities and receipt of technologies through farmers preferred channels communication. This section focuses on the extent to which farmers' views of extension delivery as a means of using appropriate technique of disseminating technologies that meet their demand.

### **4.2.1 Main Extension Activities that farmer have participated**

The major activities of the extension organizations in the study area to which farmers participated were planning of annual extension activities, farmer trainings, extension demonstrations and field days and durbars. Among these activities, majority of the respondents (34.4%) preferred to participate in farmer's field days. A further 25.9% preferred participation in training sessions and 22.3% preferred demonstrations. Farmer participation in extension activities could empower them and build their self confidence in

interacting with their peers and development agents. By participating in extension activities farmers could influence and make planned activities more demand driven and farmer oriented.

#### 4.6 Main Preferred Extension Activities

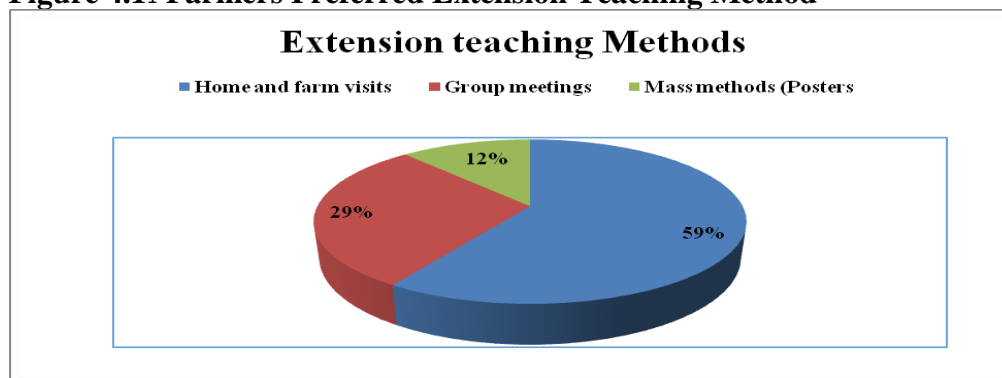
Activity	Freq.	%
Planning session	34	13.8
Training sessions	64	25.9
Demonstrations	55	22.3
Field days	85	34.4
Durbars	9	3.6
<b>Total</b>	<b>247</b>	<b>100</b>

*Source: Survey data 2013*

#### 4.2.2 Extension Teaching Methods

Extension Service Providers in the Upper East region communicate their technologies to farmers using three basic extension methods (group meetings, home and farm visits and the use of mass communication methods). The study found that 59% of the farmers considered the farm and home visit more important whilst 29% of the respondents also preferred the group method as method of interacting with the Extension Agents. The rest of the respondents (12%) preferred the use of mass media.

The choice and use of a particular method could be depending on the activity, the location and the resources available to the Extension Agents. The individual method was ranked high because it facilitate prompt feedback from agent and also fosters high level of interactivity among farmers, extension and research. The low preference for the mass method may be due to the cost and the low literacy levels of the farmers. This implies that Extension Agents intensify use methods so as the meet the needs of all farmers.

**Figure 4.11 Farmers Preferred Extension Teaching Method**

Source: Survey data 2013

#### 4.2.3 Contact between Extension Agents and farmers

The study found that majority of (67.8%) of farmers contact with extension agents only once in a month whilst another 32.2% are reached by Extension Agents once on a fortnightly basis which is in line with the T&V system of extension piloted in the study area under the defunct Upper Region Agricultural Development Project (URADEP) and only 16.9% meet extension agents once a week which is hardly practiced.

The low frequency of visits to farmers by Extension Agents could be due lack of funds and logistics from the central government and delays in release of quarterly budget allocations to the M/DADUs by Ministry of Finance for extension activities. Low contact between A.E.A's and farmers may delays carrying out of planned extension activities as well in making visits to farmers and could further delay the dissemination of technologies and innovations to the farmers. When the data was subjected to Chi-square ( $\chi^2=84.74576$  df = 1  $0.50 < p < 0.70$ ) analysis it was found that the frequency of visit by AEA to guinea fowl farmers has no significant influence in extension delivery

**Table 4.7 Frequency of A.E A's contact with farmers**

<b>Frequency of Visit</b>	<b>Number of respondents</b>	<b>%</b>
Once a week	20	16.9
Once a fortnight	18	15.3
Once a month	80	67.8
<b>Total</b>	<b>118</b>	<b>100</b>

*Source: Survey data 2013*  $\chi^2=84.74576$ ,  $df = 1$   $0.50 \square p0.70$  (Significant)  $N=118$

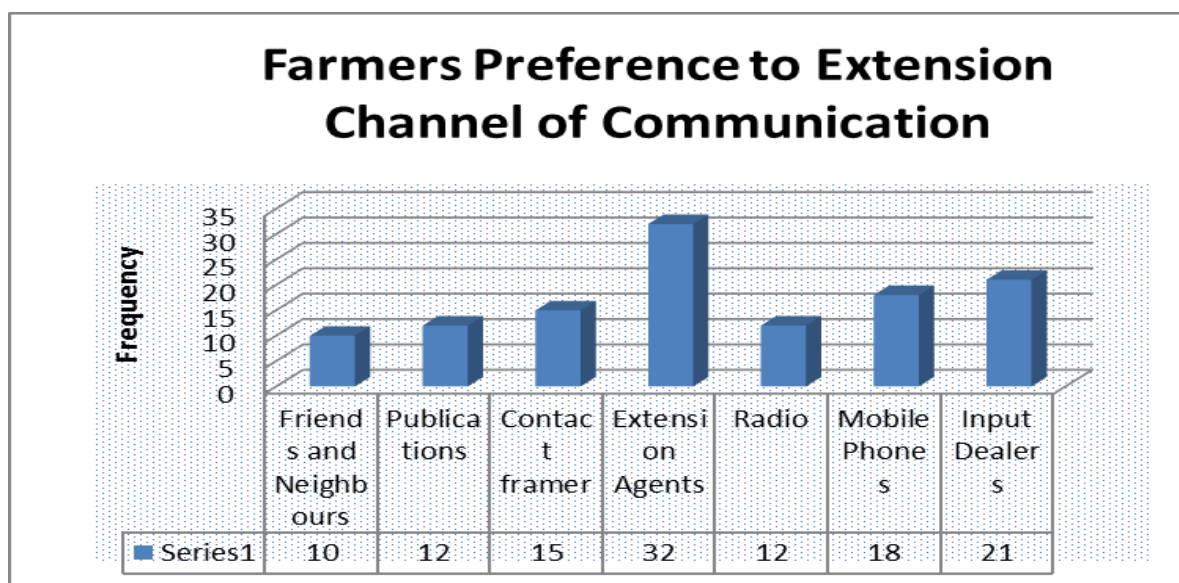
#### **4.2.4 Channels of Extension Communication.**

The study found that there are seven channels of communication between farmers and extension service providers that farmers prefer extension message to be used to communicate to them. These channels of extension delivery within the study area include Extension Publication, (Brochures and leaflets), use of contact farmers or Lead Farmers, Extension Agents themselves as a channel, Farmers friends and neighbours, Radio, Mobile Phones and Input dealers.

The respondents were asked to indicate their most preferred communication channels should all the listed channels be made available and accessible to them. The results indicate that Agricultural Extension Agents were the most preferred channel by majority of the respondents (32). Input Dealers occupied the second position in the range with 21 out of the 120 respondents as illustrated in the Figure 4.2. Phone calls are also an important channel for agents to communicate with farmers as 18 of the respondents preferred the use of mobile phones as a channel of communication. The fourth preferred channel is the contact farmer and the next preferred is the extension publications/ hand-outs and the radio with friends and neighbours as the least preferred channel of communication as illustrated in the figure 4.2 The high preference rating of Extension Agents and Input Dealers may be due to the interpersonal interaction and immediate feedback received by farmers from

input dealers and agents. The low preference for radio and publication may be due to non-interactivity and the cost to farmers.

**Figure 4.2 Farmers Preference to Extension Channels**



*Source: Survey data 2013*

#### 4.2.5 Extension Organizations on guinea fowl production

Table 4.8 illustrates the major extension service providers in the study area interacting with farmers. The service providers are categorized into the public, private and community based organizations. The public sector extension organizations are MoFA and ARI, Private Service providers are mostly NGOs such as Farmer Training Center, Trias Ghana, BUSAC Fund and IFDC whilst the Community Based Organizations are the GUIFFA and the FBOs.

The study found that the level of collaboration and coordination among them is weak due to absence of a centralized coordinating institution. The data generated is categorized in terms of quality and affordability of services to the farmers. The majority (66%) of the respondents viewed private organizations (NGOs) to provide quality extension service as against 41% of the respondent's preference for public extension organization. However in

terms of affordability 78% of the farmers viewed public extension organization to be more affordable whilst only 7% preferred the services of the Community Based Organizations. The implication of the results is that whilst the public extension is rated high in terms of affordability, a higher rating was given to private organization (NGOs) for providing quality services.

The high rating for the public organization may be due the dominant presence of MoFA Extension Agents whilst private organizations is ranked high due to diversify and the multiplicity of services provided to the farmers such as regularity of trainings, provision of inventory credit and involvement of farmers in planning, implementation and evaluation of the activities.

**Table 4.8 Ranking of quality and affordability of Extension Organizations by farmers**

Organization	Frequencies	
	Quality	Affordability
Public Organizations	41	78
Private Organizations	66	35
Community Organizations	13	7
<b>Total</b>	<b>120</b>	<b>120</b>

*Source: Survey data 2013*

### **4.3. Knowledge and Skills of Extension Agents on Guinea Fowl Production**

Effective and efficient extension services play a pivotal role in boosting agriculture and uplifting the economic conditions of the end user (Khan et al, 2011). This section focuses on Extension Agent contribution to making extension delivery efficient and effective. The study encapsulate aspect such as Extension Agent to farmer ratio in the study area and the implication to extension delivery, knowledge of AEAs, trainings offered A.E.A and relevance of the trainings and the training needs of Extension Agents.

### 4.3.1 Agricultural Extension Agents to Farmer Ratio

The table 4. Illustrate the Extension Agent farmer ratio in the study area. The ratio of AEA varies from 10,970 to 8,244 in the Bawku West and the KNWD districts respectively. The ratios shows the Extension Agents visits more than thrice the national projected ratio of 1:1,800. The high ratio of AEAs to farmers in the region could be attributed non-replacement of retired and those who vacate post for other jobs and harsh economic conditions of the area which make the area unattractive to most public service workers. The low number of Extension Agents coupled with the disperse settlement in the region could account for low coverage of farmers especially those in distant and remote area. Information and technology dissemination could be low and so many small scale farmers could be operating out of reach of Extension Agents.

**Table 4.9. A.E.As to Farmer Ratio in the Study Area**

District	Total Pop.	Number of A.E.A'S in the District	Estimated Farmer Pop. (70%)	A.E.A : Farmer Ratio
Bawku West	94,034	6	65,823	1:10, 970
Bolgatanga	131,550	10	92,085	1: 9,208
KNWD	70,667	E6	49,466	1: 8,244
<b>Upper East</b>	<b>296,251</b>	<b>22</b>	<b>207,375</b>	<b>1:9, 426</b>
<b>National</b>				<b>1: 1,800</b>

*Source: survey Data 2013*

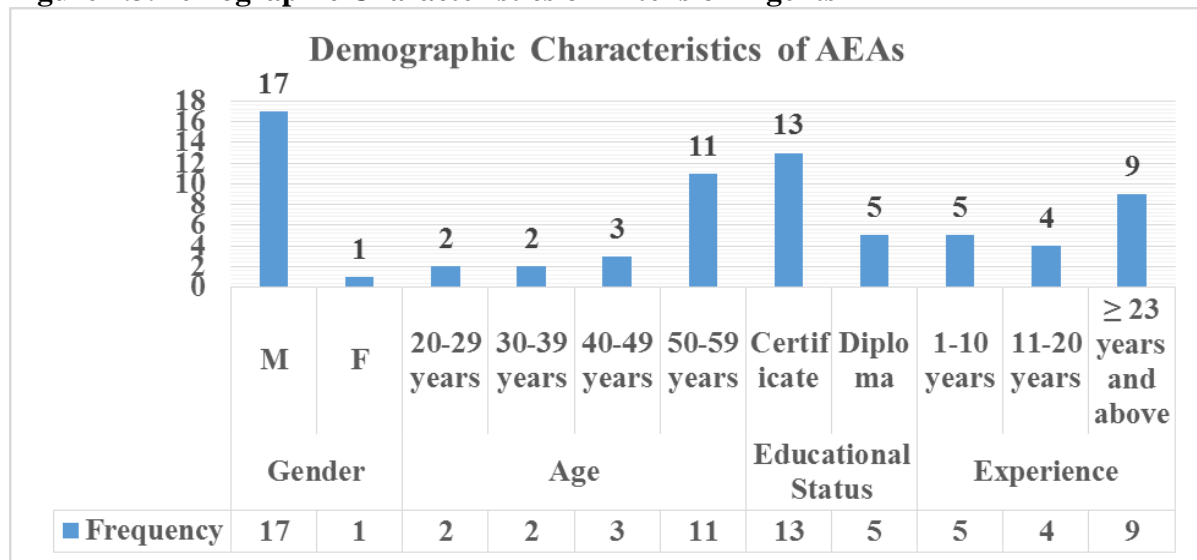
### 4.3.2 Demographic characteristics of Agricultural Extension Agents

The figure 4.3 indicates the demographic characteristics of extension agents in the selected districts where the study was carried out. The figure captures the gender, ages, the educational level and the number of years in the service and the ages of the Extension agents. Out of the eighteen agents the study captured only one was a female and the rest were males. Their ages ranges from 25 to 56 years. 13 of the AEAs had certificate in general Agriculture whilst 5 had diploma in Agricultural Extension. Majority (9) of the

AEAs had worked for more than 20 years whilst 5 between 1 and 10 year of service and 4 worked for 11-20 years as Extension Agents.

The number of years in service has a relation with experience thus majority of AEAs had worked for more than 23 years and thus has and a further 4 had more than 10 years practical experience whilst only 5 had less than 10 working experience. Majority of the agent who had more than 20 years working experience are could apply their previous experiences in similar situations

**Figure 4.3. Demographic Characteristics of Extension Agents**



*Source: Survey Data 2013*

#### **4.3.3. In-service Training on guinea fowl production received by Extension Agent.**

Table 4.10 shows the Extension Agents participation in training programmes within a year (From January 2012 to January 2013). The survey observed that majority of the Extension Agents (66.7%) never had any on the job training. On the other hand only 11.1% attended more than one training and a further 22.2% had one training within the period under review. Regular trainings are a basic component to effectively communicate new technologies to farmers, therefore, proper attention must be given to the trainings of Extension Agents. Without proper training, they cannot perform up to the mark in the field.

According to Erbaugh et al. (2007) developing effective in-service educational and training programs is an important method for addressing a problem of technology transfer.

The findings reveal that all the extension agents did not get the opportunity to attend the training programs because of limited number of trainings. Thus proper training programs are needed for the extension agents to enhance their professional skills and technical competencies.

**Table 4.10 Trainings received by Extension Agents on guinea fowl production**

Category	Freq.	%
None	12	66.7
Once	4	22.2
2 or more training	2	11.1
<b>TOTAL</b>	<b>18</b>	<b>100</b>

**Source; Survey data 2013**

#### **4.3.4 Relevance of Training Received by Extension Agents**

The table 4.11 shows the level of Extension Agents agreement on whether training received was relevant to Guinea fowl production. As can be seen from the table in a response to a 5 point scale, only 5.6% of the Extension Agents agreed that training received was relevant to their work and the Guinea fowl farmers. In the same vain 22.2% of the respondent strongly disagreed to the proposition that the training was relevant and a further 16.7% disagreed and 11.1% indicated that they strongly agreed that the training was relevant. In other words 16.7% of the respondents were trained on topics relevant to Guinea fowl production whilst 38.9% of the AEAs trained found the training unrelated to Guinea fowl production. The study found that low skills knowledge and skills of MoFA staff on Guinea fowl husbandry could be traced inadequate trainings in the relevant areas

**Table 4.11 Relevance of Training Provided to A.E.As**

<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
Strongly Disagree	4	22.2%
Disagree	3	16.7%
Undecided	8	44.4%
Agree	2	11.1%
Strongly Agree	1	5.6%
<b>TOTAL</b>	<b>18</b>	<b>100%</b>

**Source; Survey data 2013**

#### **4.3.5. Knowledge of Agricultural Extension Agents on Guinea Fowl Production**

Information was obtained from 18 Agricultural Extension Agents from the selected districts on their experience of working with the small scale Guinea fowl farmers as illustrated on table 4.9. Information obtained indicates that only of the Agents 12% (2) had knowledge on some aspect of Guinea fowl production whilst majority (88%) (16) of the A.E.As had very little information on Guinea fowl production. It was observed that the Agent had no knowledge and skills on health, keet management, the general characteristics of the bird, and determination of sex before the age of seven weeks, disposal of mortality and pest and diseases of the Guinea fowl. Some aspect where the Agents some knowledge were the management systems, the breeds of Guinea fowl, selection of foundation stock and egg incubation using the local hen. The study further found that the knowledge levels of AEA are significant to guinea fowl production confirmed. The implication of the knowledge level of Extension Agents is that extension around the bird is low and thus inability of the agents to develop extension technology and information on Guinea fowl husbandry to the extension for the small scale farmers.

**Table 4.12. A.E.AS Knowledge and Skills on Guinea Production**

Area of Knowledge	Freq. (N=18?)	
	Yes (%)	No
Guinea Fowl Management Systems	6	12
Breeds of Guinea Fowls	3	15
Sample Coop Construction of Housing	2	16
Feeding and Feed formulation	5	13
Medication/ Flock health	0	18
Egg production/ Incubation	0	18
Keet Management	1	17
Characteristics of the Guinea fowl	0	18
Selection of Foundation Stock	6	12
Sex Determination	0	18
Egg Incubation	4	14
Mortality Disposal	0	18
Diseases and Pests of Guinea fowl	0	18
<i>Average Knowledge level of AEA on Guinea fowl production</i>	<b>2.1</b>	<b>15.9</b>
<i>Overall Percentage of Knowledge of AEA on GF production</i>	<b>12%</b>	<b>88%</b>

**Source; Survey data 2013**

#### **4.3.6. Trainings Needs of Agricultural Extension Agents.**

Extension Agents were asked to list the skill and knowledge that they require to effectively develop, package and deliver an effective and efficient extension messages in a manner that can contribute to increasing the production of Guinea fowl among the small scale farmers. Their responses were ranked in order of priority according to the score of respondents listing a particular training need and this is the summary of their responses is indicated in table 4.12. The majority (17) of the A.E.As recommended higher tertiary education as best measure to enhance their professional development which could contribute to enhancing extension delivery. On informal training 13 of the AEA suggested intensive training and refresher trainings on Guinea fowl husbandry.

In the order of priority the Extension Agents indicated their training needs in order of priority on extension communication skills, establishment of demonstration on Guinea fowl production, development of training needs and group facilitation. It is believed that

the attainment of these trainings needs is key to improving and enhancing sustainable guinea fowl production in the study area.

**Table 4.13 Training Needs of A.E.As**

TRAINING NEED	SCORE		
	Score	%	Rank
<b>FORMAL TRAINING</b>			
Higher tertiary education	17	94.4	1 <sup>st</sup>
<b>INFORMAL TRAINING</b>			
Training of Guinea fowl production husbandry	13	72.2	2 <sup>nd</sup>
Improving Communication Skills	11	61.1	3 <sup>rd</sup>
Demonstrating appropriate technology on Guinea fowl production	10	55.6	4 <sup>th</sup>
Facilitating Multi-Stakeholders Fora	8	44.4	5 <sup>th</sup>
Development of Training Material	7	38.9	6 <sup>th</sup>
Group Development and facilitation	5	27.8	7 <sup>th</sup>

*Source; Survey data 2013*

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENTATIONS

#### **5.0. Introduction**

This chapter summarises the research problem, objective of the study and the major findings and the implications of the findings. Also conclusions were drawn as well as some recommendations made based on the findings.

#### **5.1. Research Problem, Objectives and Methodology**

Empirical evidence as well as experience from the field suggests that Guinea fowl production stands tall among a number of agricultural commodities in the Upper East Region that could contribute to sustainable food and income security. The production of the Guinea fowl however, continue to be dominated and operated on small scale due to high mortalities associated with the extensive system of management by the small scale farmers. The issue of research and extension delivery are among the problems of the small scale farmers. The study sought to assess the potential of extension delivery in improving the Guinea fowl production by the small scale farmers in the Upper East Region. The study purposively sampled 120 small scale farmers and 18 Extension Agents to participate in the study. A survey instrument was designed, pretested and administered to the sampled respondents.

## 5.2 Major Findings of the Study

The study found that:

- I. The socio-economic characteristics of the Guinea fowl farmers such as age, their level of education, incomes and the level of the production influence their information search and therefore the technology adoption.
- II. The contact between Extension Agents and guinea fowl farmers is very low. These low contacts between A.E.As and farmers have impacted negatively on the frequency of visits made by AEAAs to farmers.
- III. The major method of extension teaching of farmers' is the individual method. This coupled with the use appropriate communication channel has the potential to improve information flow among actors in the Guinea fowl value chain. Several efforts by MoFA to improve transfer of knowledge have been concentrated on interface between research, extension and farmers. However the study discovered that the use of multiple channels to reach farmers is a more efficient approach to meeting the information needs of the different categories of farmers.
- IV. Apart from Extension Agents, the study found other channel of disseminating technologies exist and been utilized and that farmers can make use of these alternative sources of information on Guinea fowl production. These alternatives include input dealers, URA-radio and contact farmers.
- V. Private Extension organizations (NGO) are emerging as major organizations delivering agricultural technologies to the small scale farmers. Strengthening the Collaboration among extension organization could improve information and technology transfer to the small scale farmers.
- VI. The knowledge and skills of extension Agents on Guinea fowl production is low. This, the study found was due to insufficient knowledge and skills obtained from the agricultural training institutions and on the job trainings.

- VII. The major training need of Extension agents in the Upper East Region is on Guinea fowl production. The Agents require intensive trainings and refresher training to improve the knowledge and skills on all aspect of Guinea fowl production in order to improve extension delivery to the farmers.

### **5.3 Implications of the Findings**

The implications of the study are many and varied.

A combination of information sources should be made available to Guinea fowl farmers in order to reach all the different categories of farmers. This is further buttressed by the fact that the differences in the socio-economic characteristics of the Guinea fowl farmers affect their information search for improved technologies on Guinea fowl production and this further exposes them to diverse source of information.

Public Extension Agents remained a major channel of information and technologies to the Guinea fowl farmers. To further improve extension delivery to the small scale Guinea fowl farmers, MoFA could facilitate the full implementation of Private Public Participation (PPP) policy in extension delivery. This has become crucial and urgent due to dwindling number of Extension Agents in relation to the large number of farmers and Operational Areas (OA) for Extension Agents.

Training and retraining of Extension Agents on Guinea fowl production and communication skills could strengthen the MOFA's institutional capacity to be able to design appropriate training materials that could help improve extension delivery to the different categories of farmers.

Training is important for organizational effectiveness and survival in a world of ever changing technologies. A cursory approach for identifying training needs involves the

rating of training needs by the intended beneficiaries. The training needs agreed on by Extension Agents should be implemented before other needs. Regular allocation of resources to assessing the training needs of Agricultural Extension Agents is a major step towards reducing the knowledge gap.

#### **5.4. Summary and Conclusions**

The study observed that the socio-economic characteristics of farmers affect their adoption of improved farming practices. The study found that the ages, gender, educational status, levels of income and their management practices affect their information search behaviour and consequently their technology adoption.

The study further found that extension delivery to the Guinea fowl farmers is low due to low participation of farmers in the planned activities of extension service providers. This could be attributed to low contact between Extension Agents and farmers. The use of multiple methods and channels of extension delivery is a significant process and a step to enhancing extension delivery as well as improving technology and information dissemination to the Guinea fowl farmers.

Private Extension service provision is an option that can contribute to reducing the wide Extension Agent to farmer ratio found in the study as farmers obtain their information and technologies from alternative sources.

The study found that due to low human resource capacity of MOFA on Guinea fowl production, the frontline staffs are poorly equipped to educate the numerous small scale farmers with relevant skill and knowledge on Guinea fowl production. This is further magnified by the fact that MOFA and the other stakeholders have no institutional scheme to train and equip the farmers and the Extension Agents to improve Guinea fowl

production. It is concluded that overwhelming majority of the sample respondents urgently needed required training on improved management practices. Moreover, the trainings should incorporate the needs of the Guinea fowl farmers and well planned to include all the actors in the Guinea fowl value Chain.

Extension Agents play an important role in the diffusion and dissemination of new agricultural technologies and thus, should be given priority for training. This would enable the farmer to be benefited for proper utilization of new technological packages.

### **5.5. Recommendations**

The study observed systemic inadequacies in knowledge and skills of Extension Agents in Guinea fowl production. This study found could be attributed to background of their professional trainings of the staff. The curricula of the agricultural training institutions do not equip the extension professional with the requisite knowledge, skills and technologies on Guinea fowl husbandry as well equipping them to meet the demands of the small scale farmers. This study therefore recommends retooling of the curricula of the training institutions to meet the needs of the varied clients of Extension Agents.

The study also found that MOFA institutional capacity to deliver extension on Guinea fowl is low. The issue of low Extension Agent to farmer ratio could contribute significantly the low coverage of especially the small scale farmers in the deprived areas. To address the staffing gap MOFA could adopt the lead farmer concept who are resident in the communities and train them as Extension Volunteers to bridge the gap between farmers and extension services. This further requires frequent refresher trainings for the Lead Farmers.

Fast tracking the full implementation and broadening the scope of Private Public Participation (PPP) policy initiated by MOFA in 2000 could improve the performance and efficiency in service delivery to the numerous unreached small scale farmers to strategically contribute to improve the economic fortunes of the small scale farmers.

Currently Guinea fowl production in the study area is associated with myriads of production constraints confronting both the farmers and the extension service providers. The issue of appropriate technology that meet the demands of the small scale farmers, extension personnel and researchers is a case. The study proceed to recommend the design and implementation of an aggressive capacity building scheme for all the actors in the Guinea fowl value chain and further supporting a sustained research on ways of improving Guinea fowl production.

As part of towards improving the capacity of MOFA, Agricultural Extension Agents with Diploma and lower academic qualifications should be encouraged to obtain higher professional degrees in agricultural extension and related fields. This will broaden their views about their work and could enhance their moral in extension delivery.

The stakeholders involved in facilitating the development of the Guinea fowl value chain in the Upper East Region should consider initiating the Innovation System Extension Approach to complement the efforts of MOFA on extension delivery with emphasis on Convergence of Sciences (CoS) to bring on board the aspirations, knowledge, experiences and the perspectives of the diverse actors in order to ensure a holistic development of the sector

The study also observed that the subject area is very broad and could not be exhausted within the framework of the study. The study is only a reminder to the stakeholders of the enormity of the challenge confronting the small scale Guinea fowl farmer's and could be addressed from various angles. Further research in the concern area is therefore recommended in this subject area as a way of addressing the challenges in the sector.

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**APPENDICES****APPENDIX I: FARMERS QUESTIONNAIRE**

Department of Agricultural Extension,  
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University of Ghana

Sir/Madam, I am a student of the University of Ghana conducting a survey on Assessing the Potential of Extension Delivery on Guinea Fowl Production by Small Scale Farmers in the Upper East Region. You have been selected to provide the needed information that will enable me complete the project. I will therefore like to solicit information from you regarding Guinea fowl production. I am interested to learn what your opinion is about in the guinea fowl production. The information you provide will be used to generate a better understanding of what can/should be done by the actors and service providers to improve the guinea fowl production in the Upper East Region. All information generated shall be treated with confidentiality.

***THANK YOU***

1. District.....
2. Village/Community.....
3. Household Name.....

**A). BACKGROUND AND SOCIO-ECONOMIC CHARACTERISTICS**

4. Name of Farmer; .....

5. Age

- 21-40 [ ]
- 41-50 [ ]
- 51-60 [ ]
- > 61 [ ]

6. Sex M [ ] F [ ]

7. Level of Education. Tick appropriately

- Never been to education [ ]
- Basic [ ]
- SSS [ ]
- Tertiary [ ]

## 8. Level of Income

- From GH¢100.00- GH¢500.00 Annually [ ]
- From GH¢500.00- GH¢1000.00 [ ]
- Above GH¢1,000.00 [ ]

## 9. Religion

- Christian [ ]
- Moslem [ ]
- Traditional [ ]
- Atheist [ ]
- Others specify .....

## 10. Marital Status

- Married [ ]
- Never Married [ ]
- Divorced [ ]
- Widowed [ ]

## 11. Number of Children.....

## 12. Crops Cultivated

S/NO	Crops	Number of Acres
1	Millet	
2	Sorghum	
3	Maize	
4	Groundnut	
5	Soya bean	
6	Beans	
7	Sweet potato	
8	Vegetables	

13. Do you keep Guinea fowl? Yes [ ] No [ ]

## 14. Scale or size of production

- Small scale producer (20 to 100 birds) [ ]
- Medium Scale producer (100 to 500 birds) [ ]
- Large Scale producer above 500 birds [ ]

## 15. Livestock kept

S/NO	Livestock	Number
1	Cattle	
2	Sheep	
3	Goats	
4	Fowl	
5	Guinea fowl	
6	Ducks	
7	Turkeys	
8	Rabbits	

## 16. what are your sources of income

- Sale of crops [ ]
- Sale of ruminants [ ]
- Sale of Guinea fowls [ ]
- Remittances [ ]
- Petty trading [ ]
- Government pay/ pension [ ]

## 17. What management systems do you use for your Guinea fowl production?

- Extensive (Free range) [ ]
- Semi-intensive system [ ]
- Intensive [ ]

**B). EXTENSION DELIVERY**

## 18. What is your preferred extension educational activity on Guinea fowl production?

- Keet management [ ]
- Feeding and feed formulation [ ]
- Disease prevention and management [ ]
- Housing [ ]
- Marketing [ ]

## 19. What are the main extension activities Guinea fowl farmers are involved?

- Planning session [ ]
- Demonstrations [ ]
- Field days [ ]
- Durbars [ ]

- Others .....

20. Have you ever participated in any of these activities Yes [ ] No [ ]

21. If yes, how many times in a year?

- 1 [ ]
- 2 [ ]
- 3 or more [ ]

22. How often are you visited by Extension Officers?

- Once a week [ ]
- Once a fortnight [ ]
- Once a month [ ]

23. What methods are used by the Agric. Extension Agents?

- Home and farm visits [ ]
- Group meetings [ ]
- Mass methods (Posters) [ ]

24. What are your major sources of extension messages?

- Radio [ ]
- Phone calls [ ]
- Publications [ ]
- Agric. Extension Agents [ ]

25. What are your sources of information on Guinea fowl Production?

- Input dealers [ ]
- URA-Radio [ ]
- MoFA AEAs [ ]
- Extension Bulletins [ ]
- Others..... Add to the list

26. What are the main extension organizations that provide extension on Guinea fowl?

- Public Organizations [ ]
- Private Organizations [ ]
- Community Based-Organizations [ ]

- Others .....

27. How would you rank the Extension Organizations in terms of quality and affordability?

Tick 1 for very high, 2 for high and 3 for low

<b>Channel of Communication</b>	<b>Quality</b>	<b>Affordability</b>
Public Extension Organization (A.E A)		
Private Extension Organizations (NGO)		
Community Based organization (CBO)		

**APPENDIX III: QUESTIONNAIRE TO ASSESS AEA  
KNOWLEDGE ON EXTENSION IN GUINEA FOWL  
PRODUCTION**

- 1) Name of Extension Agent.....
- 2) Operational Area.....
- 3) District.....
- 4) Educational Level [1] Certificate in general Agriculture [2] Diploma in Agriculture
- 5) Do you have adequate knowledge on Guinea fowl production? Yes [ ] No [ ]
- 6) If Yes indicate area of knowledge on guinea fowl production
  - a. ....
  - b. ....
  - c. ....
- 7) Source of knowledge on Guinea fowl production
- 8) Have you attended any training in the past year Yes [ ] No [ ]
- 9) If Yes indicate the frequency of training
  - a. Once a month [ ]
  - b. Twice a month [ ]
  - c. Never [ ]
- 10) Have the training been relevant to your work and Guinea fowl production?  
Yes [ ], No [ ]
- 11) If Yes what is level agreement
  - Strongly disagree [ ]
  - Disagree [ ]
  - Undecided [ ]
  - Agree [ ]
  - Strongly agree [ ]
- 12) Do you require extra trainings on Guinea fowl production

13) Kindly indicate the knowledge and skills you require capacity building to improve your work

- i. ....
- ii. ....
- iii. ....

14) In your view what are constraints of Guinea fowl farmers

- Diseases and health [ ]
- Nutritional constraints [ ]
- Environmental [ ]
- Socio-cultural [ ]
- Technical [ ]
- Inadequate investment [ ]
- Breeding [ ]
- Performance [ ]
- Extension Delivery [ ]

29). Do you have any to information to add or question to ask?

**THANK YOU**