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COMMERCIAL FEED AVAILABILITY AS A FACTOR IN POULTRY (CHICKEN) PRODUCTION IN SEKYERE WEST DISTRICT, ASHANTI REGION, GHANA

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BY

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COMMERCIAL FEED AVAILABILITY AS A FACTOR IN CHICKEN (POULTRY) PRODUCTION

M. Sc. CATHERINE KWARTEMAA OKO ESHUN 2008

DECLARATION

Candidate's Declaration

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

Candidate's Signature: …… Date: …….

Name: CATHERINE KWARTEMAA OKO ESHUN

Supervisors' Declaration

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

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ABSTRACT

Commercial feed availability is essential in areas where poultry (chicken) farmers practice intensive production. A study was thus undertaken in the Sekyere West District (SWD) of Ashanti Region to determine the availability of commercial feed as a factor in chicken production. The study also assessed patronage of Agricare feed in Mampong, SWD, covering a period of 3 years (2004-2006). A census survey, involving 62 active chicken farmers and the feed supply agent in the district, was conducted using interview schedules in 2007. The availability and use of commercial feed, farmers' preferences, benefits derived, challenges and possible solutions were studied. Statistical product for service solutions (SPSS) was used to analyse the data. Chicken production was found to be a primary occupation for 64% of the farmers studied. Availability of Agricare feed in Mampong was confirmed by 95.00% farmers. Though 93% farmers were literate, 27.42% of them were untrained in feed formulation and 88.71% preferred commercial feeds. Farmers were satisfied with the feed quality and 15 (24.19%) became poultry farmers due to the establishment of the feed outlet at SWD. Availability of the feeds has helped 77.41% of the farmers to improve their bird productivity. Bird populations increased from 72,210 in 2004 to 100,360 in 2006 with marked increases in cockerel production. It was concluded that, availability of quality poultry feeds has a positive influence on production and is critical to farm expansion. It was recommended that ready availability of high quality and preferred types of commercial feeds coupled with financial support to farmers is a priority need to enhance development of the poultry industry in SWD of Ghana.

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DEDICATION

This book is dedicated to the Okoh - Eshun Family: particularly, to my husband, Mr. Francis Evans Eshun and our three lovely daughters; Dr. Mrs. Andrea Patricia Akorli, Miss Deborah Eyaaba Eshun and Miss Francisca Emmanuella Eshun.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF ACRONYMS / ABBREVIATIONS

AEAs	Agricultural Extension Agents
AGDP	Agricultural Gross Domestic Product
AgSSIP	Agricultural Services Subsector Investment Programme
APD	Animal Production Directorate
CIDA	Canadian International Development Agency
DA	District Assembly
DADU	District Agricultural Development Unit
DDA	District Director of Agriculture
DFID	Department for International Development
DVSD	District Veterinary Services Directorate
FABS	Food and Agricultural Budget Support
FADB	Food and Agricultural Development Budget
FAO	Food and Agricultural Organisation
FASDEP	Food and Agricultural Sector Development Policy
FBO	Farmer Based Organisations
GDP	Gross Domestic Product
GOG	Government of Ghana
Mth.	Month
MoFA	Ministry of Food and Agriculture
NCD	New Castle disease
NGO	Non Governmental Organisations
RLRL	Role of Livestock and Rural Livelihoods

SB	Standards Board
SON	Standards Organization of Nigeria
SPSS	Statistical Product for Social Service Solutions
SWD	Sekyere West District
USA	United States of America
VSD	Veterinary Services Directorate
Yr.	Year

CHAPTER ONE

INTRODUCTION

Background information

Availability of nutritionally balanced feed from reputable sources is critical to production in the poultry industry (Speedy, 2001). Poultry farmers in Ghana contribute about 60% of the 7% national livestock contribution to the country's Agricultural Gross Domestic Product (AGDP). However, local production is only able to satisfy 30% of the country's animal protein needs (MoFA, 2001). Increasing population growth and urbanisation continues to fuel demand for poultry products and the resultant huge import bills. The drain on foreign exchange and the national economy makes it urgent to substitute imports with increased local chicken production. Chicken are unique in their characteristics; they are fast growing, give quicker returns in terms of meat, eggs and income than other livestock species. Experts feel that intensifying poultry production systems can play a vital role of alleviating meat insufficiency, malnutrition and poverty in Ghana.

The poultry sector in Ghana, however, faces many challenges including availability of regular supplies of appropriate, cost-effective and safe animal feeds as well as low technical know-how (MoFA, 2002). The cost of feed in intensive production systems, generally, takes a larger proportion (60-70%) of the total cost of production worldwide; therefore, the efficient use of feeds in these systems is a factor in profit maximization (Smith, 2001). Poultry

feed cost in Ghana, is even higher compared to other countries and takes 70 - 80 % of the production cost (Oppong-Anane, 2005).

In Ghana, rapid developments in commercial poultry production took place in the early 1970s. Extensive and semi intensive poultry farms were improved and transformed into intensive forms, which operated as large-scale, backyard or small-scale commercial poultry farms. Historically, the growth of the poultry industry was due to the establishment and rapid expansion of commercial feed mills like Agricare, Gafco, Pomadze and Darko Farms. Consequently, the establishment of a feed supply outlet by Agricare in 2004 at Mampong in the Sekyere West District (SWD) was to ensure the ready supply of commercial feed to poultry farmers (DVSD, 2004). Availability of commercial feed such as concentrates and mashes is essential to meet consumer needs. Ensuring availability and regularity in the supply of good quality commercial feeds and managing feed properly at farm level is a prerequisite to reducing the high cost of production associated with commercial chicken production worldwide, particularly in SWD of Ghana.

Problem statement

A feed supply outlet by Agricare at Mampong in the SWD, in 2004, was to ensure the ready supply of commercial feed in the form of complete balanced poultry diets. This was to reduce problems concerning quality feed availability, long distances in search of feed, and high production costs incurred by farmers prior to 2004. It was envisaged that the ready supply of feeds would ultimately improve production efficiency, enhance farmers' livelihoods and sustain the poultry industry. However, most of the ingredients

for feed formulation and preparation such as wheat bran, maize, fish meal, soya bean meal, oyster shells and premix are often scarce and expensive, even though SWD is noted for maize production. Furthermore, some poultry farmers in the district are not knowledgeable in formulating poultry diets and end up using inadequate and unbalanced self formulated diets. Meanwhile, the extent to which the poultry farmers have benefited from the provision of the feed supply outlet is not yet known, creating a knowledge gap. These concerns prompted the need to investigate and assess the effect of commercial feed availability on the state of the poultry industry in Sekyere West District.

The purpose of the study

The study was to assess the impact of availability of commercial feed by examining the perceptions of chicken producers in SWD. It was also to determine the level of patronage, benefits derived, the challenges and possible solutions identified by the poultry farmers and the feed supply agent.

Research questions

1) What is the level of availability and the extent of feed patronage by farmers in Mampong?
2) What are the measures instituted by Agricare to ensure availability, affordability and maintenance of high quality of the feeds to be sold?
3) What are farmer's preferred feed types and the benefits that have been derived from commercial feed availability in Mampong?
4) What are the challenges and possible solutions of the poultry farmers?

Objectives:

The main objective of the study was to examine commercial feed availability as a factor in poultry production in Sekyere West District (SWD).

The specific objectives of the study were to:

1. Determine the level of availability and extent of usage of the commercial poultry feed in SWD from 2004-2006.
2. Assess measures instituted by Agricare to ensure availability, affordability and maintenance of high quality of the feeds sold to farmers in SWD and the resultant effect on poultry production.
3. Examine the benefits derived by farmers associated with their choice and use of the commercial feed types in the district.
4. Find out four major challenges faced by poultry farmers in SWD.

Justification for the study

The Sekyere West District (SWD) is a leading producer of maize grain, a feed ingredient that usually constitutes at least 50% of rations. The SWD could thus become a very important poultry production area, providing relatively cheap poultry products if the advantage of cheap grain supplies is complemented with high quality poultry feed concentrates. Nutritionally balanced cost effective feeds, ultimately, save direct and indirect costs. Established and reputable feed have simplified feed formulations which farmers, even the unknowledgeable, could make use of when products from these commercial feed mills are purchased. The use of commercial feed supplies was thus found to be most convenient for poultry farmers in SWD to supplement locally available maize. Commercial feed producers have the

advantage of scale of production because large quantities can be produced at comparatively low cost. The feed thus sell cheaper, s more affordable, and could help chicken farmers to best meet their production targets. The use of complete commercial feed could also reduce the dread of farm work and offer farmers the benefit of farm expansion in terms of bird numbers. Ready available feed situated close to farming communities reduces freight cost.

This study will provide information and direction to the establishment of similar commercial feed sales points and supply of high quality feed to enhance poultry production in Sekyere West District and other parts of Ghana.

Expectations:

The findings should:

1) Guide poultry extension agents and researchers to communicate appropriate technologies to poultry farmers.

2) Guide the feed sales agent as to what should be supplied to satisfy the demands of poultry farmers.

3) Help farmers improve their knowledge and preferences in assessment, selection and use of good quality chicken feeds.

4) Guide policy makers to formulate and enforce poultry farming and feed laws to address challenges in poultry farming, create employment and generate income especially among the youth in poultry farming areas in SWD.

5) The study would awaken and enable feed manufacturers to undertake strict quality control measures to produce adequate, good quality and affordable feeds. This will benefit and encourage farmers to increase the adoption rate of commercial feed use to enhance growth and development of the poultry sector.

CHAPTER TWO

LITERATURE REVIEW

In this chapter, literature has been reviewed covering a worldwide perspective of the poultry industry and production systems and developments made. Alternative feeds, nutrient sources, availability and farmers perceptions in the use of commercial feeds, economic considerations of poultry rations and strategies to reduce feed cost, the advantages of the commercial feed sector as well as challenges in poultry production have been dealt with.

Poultry industry and production systems: Worldwide perspective

The term 'poultry' denotes all species of domesticated birds including chicken, ducks, turkeys, guinea fowls and ostriches which give man economic benefits and survive under his care (Ensminger, 1992). Plate 1 shows some poultry birds kept worldwide.

Plate 1: Poultry birds including chicken and turkey

However, poultry is used commonly to refer to the domestic chicken (both layers and broilers). The poultry industry in Ghana, generally involving the chicken, is made up of various organizations, agencies and activities involved in the production of poultry meat and eggs from the producer, through to marketing and to the consumer (Appiah, 1993). The components of the poultry industry in the USA, as recorded by Ensminger (1992) are: the producers (poultry operations involving breeding flocks, hatchery, out-growers, market egg production and game / hobby bird operations), the processors (egg and meat processing industries) and the marketing specialists (forecasters, research and development specialists, advertisers or public relations and education experts).

Chickens may be kept under intensive, semi-intensive or extensive management systems. In the classification of world livestock production systems, poultry systems are described under landless monogastric systems, where feed is introduced from outside the farm. Poultry production systems exclusively based on high-producing breeds and high energy concentration feeds are described by Sere, et al. in an FAO publication (FAO, 1996 a). In rural areas in Africa and Asia, the most dominant production systems are the extensive systems that are based on the local indigenous breeds in scavenging feeding systems (FAO, 1996 b). The farming system in Ghana has primarily been traditional, with low input and low output. Semi-intensive system, including many backyard productions, has developed recently with high input and output. Commercial chicken production however follows the intensive production system of keeping. The intensive chicken production operates a high input and output system, which is essentially open in physical and

economic terms. This is because; it uses and obtains as much as 90% or more of the resources for production from the larger environment outside the farm borders (Marfo-Yiadom, 2005). According to Speedy (2001), the intensive or landless enterprises might have a high degree of dependency on imported feed, which requires a continuous supply of large quantities of known consistent quality. Local supplies of home-produced protein (fishmeal, soyabean meal, copra cake, etc.), in particular, are often less able to provide such a reliable supply of high quality feed. There is therefore an increasing trend with large poultry producers to produce and utilize their own feedstuffs in vertically integrated systems (Speedy, 2001). Industrial systems (large industrialized type of intensive production) and small scale urban or peri urban production in developed countries employed the system where over 90% of the feed is obtained from outside the production unit.

Developments made by intensive poultry production

Wilson (1995) noted that, the rapid technological advances achieved for the intensive production systems are readily transferable, though costly in management skill, high quality feed resources, housing and equipment. Furthermore, the author stated that in countries with protein deficit, where there are no taboos, the attractions of intensive systems of poultry production and their impressive production figures are quite obvious, especially, to policy makers. Successes have thus been achieved in some countries, notably with poultry in the Arab states (Wilson, 1995). Most of the research work on animal feed is focused on the use of by-products by upgrading feed ingredients through processing and enhancing productivity in order to reduce production

costs (Balakrishnan, 2001). According to FAO (1996b), de Haans et al. reported that, the industrial poultry production is fast growing; that, the intensive poultry industry contributed more than half (about 58%) of the total global meat produced in 1996. This shows that, the poultry industry has the potential to improve the development of the livestock /poultry sub-sector, and the economy in general.

Availability of commercial poultry feeds and ingredients:

Feed for poultry is the greatest tonnage of animal feed produced globally every year. According to Speedy (2001), it is estimated that about 1000 million tonnes of animal feed is produced globally every year, including 600 million tonnes of compound feed. More than 80 percent of this feed is produced by 3800 feed mills, and 60 percent of the world total is from 10 countries. Speedy (2001) further observed that, dependency on and the need for external supplies of formulated feed will be influenced by various factors including the nature of the livestock enterprise, local feed alternatives, land and labour availability, the farming system and economics. Ensminger (1992) however, found that the availability of feeds and ingredients are subject to changes and this affects productivity. The availability of imported protein materials is often essential for local feed manufacture. However, Yankah (1994) observed that, the availability of cereal grains fluctuates and runs out shortly after peak production period (between the months of September to December); and as a result, the prices of these feeds, including imported ingredients, increase. According to Okantah, Aboe, Boa-Amponsem, Dorward and Bryant (2003), most poultry farmers experienced occasional difficulties in

obtaining feed supplies. In general, farmers were satisfied with the service and quality of feed provided by commercial feed mills. About 70-80 percent of maize produced is used as feed ingredient in the world. Atuahene et al. (1989) made the point that maize is the major source of energy supply, forming about 60 – 65 % on feed basis in most poultry diets in Ghana. Karbo and Osei-Frimpong (1992) noted that, the increasing instability of maize prices on the open market renders it the most costly component of formulation of broiler feeds. They therefore recommended the use of 15% inclusion of bread flour as an alternative to reduce cost. Smith (2001) concluded that, the poultry industry in developed countries had been possible because there had been surplus production of grains.

Chicken production in Ghana and socio-economic background of farmers

The growth and expansion of the poultry industry in Ghana shows that in 2004, a national total poultry population of 29 million was recorded as part of the 40 million national total livestock animals in Ghana (Oppng -Anane, 2005). The vision and mission of the Ministry of Food and Agriculture, in line with the overall national goal, was to reduce poverty, generate income and improve the welfare of its people, with an objective to make Ghana a leading agribusiness and industrial country in Africa by the year 2010 (MoFA, 2002). The people, especially the youth, need nutritious and adequately balanced diets, in order to constitute a healthy workforce. Livestock production is known to be a route out of poverty since it provides farmers with five essential assets such as physical, social, natural, financial and human forms to sustain rural livelihoods (MoFA / DFID, 2002). There has however been significantly

high annual import bill in recent times, from the importation of poultry products to supplement local production which has constituted a drain on the national economy. The self-insufficiency in meat, the poor state of the economy of the country, and the low standard of living of the people, imply that there is an urgent need to improve our local livestock, especially poultry industries, to enhance development of the sub sector. Population and land use pressures in developing countries are encouraging intensification and expansion of 'landless' livestock systems that result in increasing demands on natural resources and the local environment. Expansion of the chicken industry is necessary for sustaining the ever increasing consumption of poultry meat and eggs. However, the high cost of production and low level of supply of inputs have shot up the price of poultry products beyond the means of the average citizen, leading to small amounts being consumed on per head basis. Appiah, (1993) observed that while some poultry farms were expanding others were being forced out of business as a result of major threats like disease outbreaks, poor feed supplies and other problems. Furthermore, the author stated that, since greater numbers of farmers are going into poultry, co-operation between producers, feed millers, drug companies, processing plants, government agencies and research institutions, would aid the expansion of the industry. Historically, the development of the poultry industry in Ghana started in 1942 with the keeping of guinea fowls and chicken at Pokuase, and by 1964 poultry production had become an attractive enterprise.

Poultry farmers exhibit various socio-economic characteristics. Concerning the sex of farmers and their gender roles, Okantah et al. (2003) found out that 93% of the poultry farmers in a survey in Accra and Kumasi

were men; they were the main income-earners for the family but they involved their wives in the poultry enterprise. Gasson and Errington, (1999) noted that, women farmers (owners) are either single, divorced, widowed, married to non farmers, or work with their husbands as partners. They observed that, in the farm family business, the poultry farmer is the owner but authority to allocate resources may be delegated.

Looking at the occupational characteristics and enterprises operated by poultry farmers, Appiah (1993) found that, most commercial poultry farmers in Ghana operate small scale / backyard and large scale farming enterprises; and the classes of birds kept are generally layers, broilers and cockerels. According to Okantah et al. (2003), smallholder poultry production, where highly selected birds are managed under relatively intensive conditions for production of meat or eggs, is one of the livestock enterprises associated with peri-urban agricultural systems in Ghana. The author also found that, most farmers kept various populations and combinations of layers, broilers and cockerels (males of layer lines) and significantly larger bird populations were kept in the Kumasi area compared to Accra. Furthermore, layer production appeared to be the core poultry activity and a long-term, steady business where the product can be marketed with reasonable assurance of making a profit. However, the large-scale production of cockerels was found to be an interesting development, because in developed countries, males of layer strains are usually destroyed after hatching. According to Okantah et al. (2003), the fact that cockerel production seems to be a year-round activity, with little emphasis on seasonal production for festivals, suggests a steady

demand for this type of bird in Ghana. The farmers' means of livelihoods other than poultry keeping were: farming and trading.

Concerning the scale of production and bird populations, the poultry industry in Ghana, ranges from backyard with a few hundred birds (50-1000) to commercial with several thousands (over 1000) of birds (Appiah, 1993). According to Okantah et al. (2003), the official definition of a small-scale poultry flock in Ghana is less than 2000 birds but flock sizes below 100 are generally not economically feasible. Hamre (2005) observed that, one would not get rich from a small poultry flock but having the housing and labor available, one could produce good quality meat birds by starting with good quality chicks of a meat strain and following good feeding and management practices.

Demand for poultry products and current concerns

According to Gyening (1986), despite the rapid growth of commercial poultry in the 1970's, demand for poultry products was still minor compared to other livestock products because poultry products were considered a luxury and were consumed only during festive occasions. However, Peters (1999), noted that, the increased demand for food, inputs for production and infrastructural services together with the results of higher purchasing power due to increased incomes, brings about massive changes. Livestock production functions change, moving from subsistence to more intensified and specialized market oriented production.

The current concerns, according to Speedy (2001) are that, significant increases in global demand for livestock products will clearly require

increasing amounts of feed supplies. Alternative feeds and their sources will need to be continually reviewed. There will be the need for considerable increases in feed manufacture, thereby requiring a thriving, successful and modern feed industry. Speedy (2001) stressed that, specialization of feed mills was as an important identified step to avoiding cross-contamination of feed materials and suggested that, the FAO should set up country profiles of feed production by species and feed resources by countries.

Sources of nutrients required in poultry nutrition:

Animal feed is an important factor that affects the animal's growth and nutritional status. A wide variety of feedstuffs can be used in poultry rations as sources of important nutrients.

The major energy sources of poultry feeds are the cereal grains and their by-products and fats (Ensminger, 1992). According to Balakrishnan (2001), cereal grains and their by-products such as maize, rice, wheat, sorghum, millets, broken rice, germs, and damaged wheat constitute the energy sources while the cakes or oil meals such as groundnut cake, soybean meal, rapeseed meal, sesame meal, sunflower meal, coconut meal, and palm kernel meal are used as protein sources. Agro industrial by-products such as rice bran, rice polish, wheat bran, molasses and sal seed meal are also used. Although normal maize (NM) contains 8 – 9% protein, the quantity of two essential amino acids, lysine and tryptophan, is below nutritional requirements for monogastric animals, therefore, utilization of quality protein maize (QPM) can correct this deficiency and may be advantageous in the diets of livestock, particularly, monogastric animals. According to Guang-Hai et al. (2001), some

of the new quality protein maize (QPM) hybrid lines contain up to 13.5 percent protein and 100 percent more lysine and tryptophan than normal. Nelson et al. (2005) recently recommended the use of maize offal as an energy source, without deleterious effects, in broiler diets, at levels not exceeding 10% inclusion rate.

For protein requirements, Smith (2001) observed that, over twenty amino acids are known but ten are considered essential for poultry. The essential amino acids are required for growth and general well being but cannot be synthesized by birds at the rate commensurable with its requirements. The most important ones include Lysine, Methionine and Tryptophane which are likely to be deficient in the normal diet, however, efforts have been made to provide synthetic forms to be used as feed supplements. Proteins from plant sources normally do not contain these essential amino acids but fortunately enough, soya bean meal is however found to be rich in them. Other sources of plant protein mentioned earlier are groundnut cake, copra cake, soya bean meal, coconut meal, palm kernel meal.

Speedy (2001) reported that, Soybean remains the most important and preferred source of high quality vegetable protein for animal feed manufacture. Soybean meal, which is the by-product of oil extraction, has a high crude protein content of 44 to 50 percent and a balanced amino acid composition, complementary to maize for feed formulation. A high level of inclusion (30-40 percent) is used in high performance monogastric diets. Speedy (2001), reported that, legumes are a traditional source of plant proteins for animal feed and their production can provide a range of benefits both on farms and for feed manufacturers. Animal protein sources provide all the

essential amino acids and the main type used in poultry diets in Ghana is fishmeal. According to Speedy (2001), farmers face production and storage problems due to bacterial and other sources of contamination and are unsure about safety of their use. The global significance and provision of fishmeal as a protein source is uncertain. Compared with other sources of plant protein and cereals, fishmeal can also provide a good nutritional source of calcium and phosphorus. The fishing industry however, is not particularly well developed in many developing countries, and could perhaps make increased contributions to future fishmeal supply in some regions.

Concerning the minerals and vitamins, poultry feeds are known to be enriched with calcium, phosphorus in the form of oyster shells or dicalcium compounds. Trace minerals such as Fe, Zn, Mn, Cu, CO and I and vitamins A, D_3, E, K and B complex in the form of premixes, are also provided in addition to common salt (Smith, 2001). Feed additives commonly used are antibiotics, prebiotics, probiotics, enzymes, mould inhibitors, toxin binders, anti-coccidial supplements, acidifiers, amino acids, antioxidants, feed flavours, herbal extracts and pigments provided in premixes (Balakrishnan, 2001).

Alternative chicken feed types and composition

There are basically two formulations that can be used in preparation of poultry diets. These are commercially formulated and self formulated feeds. The producer has three options for selecting sources of feeds. These are:

- Using complete commercial feeds or ration (e.g. Mash, pellet, etc.)
- Using commercial protein supplements to mix feed on the farm (e.g. concentrates)

- Self-formulating or self-compounding of feed: using individual feed ingredients or feedstuffs to formulate ration on the farmer's own farm.

Smith (2001) defined commercial feeds as being composed of several ingredients, mixed in various proportions to form a nutritionally complete diet. Thus instead of being farm-mixed, commercial feeds are mixed by commercial feed manufacturers into primary and secondary forms. According to Ensminger (1992), primary feeds are complete diets, mixed from individual ingredients, sometimes adding a premix at a rate of less than 45kg per 1000kg of feed prepared as mash, pellets or crumbles. Secondary feeds are those mixed from one or more ingredients and a concentrate, normally used at the rate of 136kg per1000kg (i.e. 30% concentrate) of feed. Numerous types of commercial feedstuffs, ranging from additives to complete rations exist on the market, designed for different species of livestock and poultry needs. Some of these are complete rations, vitamin and minerals or protein supplements, concentrates, additives and medicated feeds (Ensminger, 1992)).

For the self formulated diets and home-mixing, FAO (2002) defined farm-made or self-formulated diets as consisting of one or more feedstuffs or individual ingredients (artificial and / or natural), produced into pellet or other forms for the exclusive use of a particular farming activity and not for commercial sale or profit. Duvauchelle (2006) noted that although many people buy their chicken feed, others prefer to have control of what goes into the mixture. The author cautioned that, even though formulating ones' own poultry diet may be cheaper, it requires extra time and energy and involves the risk of malnutrition or overdosing of certain vitamins and minerals; therefore, unless one knows adequately what is being done it would be better to stick to

commercial feed. According to Balakrishnan (2001) a substantial quantity of feed is prepared by farmers themselves in order to reduce the feed cost. Okantah et al. (2003) reported that, the ingredients used in home-mixed diets in peri-urban areas in Accra and Kumasi, for most chicken diets, were maize and wheat bran. The authors further observed that, a large proportion of farmers used commercial concentrate in mixing the diets: a simple diet given to broilers, layers and cockerels was 2 parts maize plus 1part wheat bran added to 1 part commercial feed concentrate.

Preston (2005) found that, the use of feed composition tables to balance feed in feed formulation is useful, but the ultimate goal of feedstuff analysis is to predict the productive response of animals when fed diets of a given composition. According to Duvauchelle (2006), balancing poultry ration is largely a matter of correcting nutritional deficiencies in the ingredients; this somewhat complicated procedure requires extra time in mixing and an understanding of the nutritional requirements of the chicken.

Ration formulation and economic consideration of feeds

In formulating ration for poultry, Ensminger (1992) noted that birds eat to satisfy their energy requirements. Thus, as a result of changes in availability of feeds and ingredients, ration formulation should be altered at different stages to correspond to changes in weight and productivity of the birds. There is also the evidence that, given a choice, birds (especially broilers) prefer particulate diets such as pellets to mash (Odoi et al, 2003). Hamre (2005) recommended that birds should be fed a complete diet from a feed supplier, or if possible, mix one's own diet by preparing the appropriate ration from a

concentrate, following the directions of the supplier. The author noted that, meat birds are fed a starter feed containing 20 - 24% protein for the first few weeks and then fed a finisher diet containing 15 - 20% protein until processing time. Okantah et al. (2003) found that some 50 farmers including those who use home-mixed rations admitted that they added a purchased concentrate to other feed ingredients. Smith (2001) noted that, the major dietary factor affecting intake in poultry is the concentration of the energy in the diet; he found that pellet feed can provide up to 8% greater energy than as mash because it is more convenient to consume. This high intake will be desirable to promote growth in young birds than in adult birds, because such a feed may cause increased fat deposition and obesity, which can also disturb the egg laying capabilities of the adult birds, thus rendering them unproductive.

For economic considerations in chicken production, Smith (2001) noted that food containing high levels of protein is expensive to purchase, therefore, a diet too high in protein is unnecessarily expensive to use. Also, different feeds exist and in selecting them, producers should know what would constitute the best for specific needs of the flock within the purchasing power of the farmer. This is because successful feed buying necessitates knowledge of all that affect net returns from the time of deciding to buy the feed to the end when product is marketed (Ensminger, 1992). Also, poultry producers or feed buyers should know the nutrient requirements of their birds, feed types and processing methods, production and economic trends, different feed grades and quality classification, restrictive use of certain feedstuffs (e.g. cottonseed meal due to anti-nutritional factors), other associative or additive effects of feedstuffs especially in protein feeds, their sources or soils grown

on, as well as their storage capabilities. Adherence to feed quality control laws or government regulations and specific needs of livestock species by feed manufacturers should be known by farmers. Additionally, transportation costs, impact of foreign feed purchases and business aspects (including sources of credit, interest rates, contracts, possible tax or savings to accrue from purchasing feeds before the year ends) should be known when buying feedstuffs / feeds for poultry production (Einsminger, 1992). Wolford (2005) noted that, with feed being the single highest cost in poultry production, it is proper to control feed wastage by examining potential areas of feed loss such as the incorrect use and poor design of feeders, incorrect feeding regime / practices. Feed storage systems (whether stored in bulk or bags) must be considered seriously to avoid spillage or contamination by birds or rodents and thus prevent excessive feed wastage of expensive feed. Proper drying of feedstuff is required prevent serious problems of moulds and mycotoxins resulting from moisture or water damage.

Feed cost components and strategies for reducing feed cost

Oppong-Anane (2005) noted that, about 70 – 80 % feed costs in poultry production in Ghana, is consistent with the feed cost in poultry industries worldwide. But apart from the stipulated price on feed as a commodity, certain factors lead to additional cost of the feed which normally is not given attention by farmers. While feed formulation and ingredients used affect feed cost at manufacture level; incorrect feeding, intake and feed wastage will also affect the cost of feed at poultry farmer level. Uneven supply of feeds or ingredients and market strategies or competition as a result of

unavailability may lead to higher pricing of the feed itself whilst transport costs on feeds purchased, interest rates on loans may also add to the cost of feed. Oppong-Anane (2005) found that, loans with high interest rates requiring unachievable cash flows to manage repayment schedules, have led to unprecedented impoverishment, especially, of large and medium scale poultry farmers. According to Osei (1990), the cost of feed is influenced by inadequate production of the main feed ingredient, maize grains, to meet human demand and that of the poultry industry. Quaye (2005) observed that the high cost of feeds was also due to poor food security in the country, since neighbouring countries come into buy our maize while we go back to buy the same maize at a higher price. Quaye further reported that, the feed mill industry is grumbling with the unstable prices of feed ingredients such that in the year 2004 alone the price of maize changed eight times from 1.7 to 2.5 million cedis per 1000 kg., whilst the price of fishmeal also changed ten times from 2.4 to 6.5 million cedis per 1000 kg.

Agbesi (1981) noted that, the importation of concentrates, premix and other feed additives add to cost of production. Therefore, feed millers should produce a percentage of their maize requirement to reduce the cost of production of feeds to make feed affordable. Furthermore, it was suggested that, improvement in local industries like the Tema Food Complex and State Fishing Corporation will enhance production of and availability of fishmeal. Thus, if farmers and manufacturers use local materials in production, the chance of greater profit would be more than using imported feed.

Yankah (1994) further attributed the high cost of feeds to factors like availability and cost of feed ingredients; that, the prices of local anchovy,

imported raw materials such as fishmeal, premixes, drugs and soya bean meal continue to increase due the depreciation of the cedi and other production cost factors like transportation, handling and storage. According to Appiah (1993), a regular transport facility is very essential in a poultry enterprise since the cost of moving of feeds, ingredients, litter/manure and eggs are considerably high. Feed losses occurring through improper usage or feeding regime, poorly designed troughs and poor storage practices also constitute part of the feed cost component or additional costs on feeds. Wolford (2005) found that, the cost of feed is established on nutritional value, so it is unwise to reduce the nutritional content of feeds to save cost since the reduction will affect the bird's performance first and there will be no gain. Wolford (2005) thus emphasized that, when purchasing raw materials for feed mixing, care should be taken that they are of the highest quality possible. Substandard grains, presence of moulds, and grass seeds cannot be fed to birds and must therefore be considered a waste.

The feed manufacturing sector, commercial feed use and advantages

Historically, the feed industry, has exploited a price-supported inexpensive grain that is traded on the global market (Speedy, 2001). Therefore, the commercial feed manufacturer has a distinct advantage of enjoying economies of scale to enable it produce and sell at cheaper prices to its customers (Ensminger, 1992). Smith (2001) reported that, the large commercial feed companies and the larger poultry producers who formulate their own diets generally rely on the services of qualified nutritionists and the use of computers to formulate rations and to ensure quality control measures.

Smith (2001) speculated that, a few large scale commercial farmers and most commercial feed manufacturers use computers which allow the automatic rejection of too costly ingredients in least cost ration formulation based on the standard unit of energy, metabolic energy (ME). In future, computers will not only formulate least cost diets but will also be used in modeling, so that the response of the bird in terms of growth and development will be taken care of when formulating the diet. Ensminger (1992) noted that, feed laws in a country govern and protect commercial feed users from contamination and losses that are unfounded. For instance, the United States of America (USA) Delaware Laws in 2007 stated that, no person should distribute an adulterated or misbranded feed identified by poisonous, deleterious or non-nutritive ingredient. Any commercial feed distributed, must be accompanied by a legible label bearing information of the product name, brand, net weight and a guaranteed analysis of the commercial feed.

Ensminger (1992) asserted that, the ultimate criterion commonly used for feed selection, is by choosing the one which will bring maximum returns to the producer for labour, management and capital. Furthermore, the author stated that, home mixing or self-formulations restricts production or bird numbers as it requires that more or part of the time and capital should be devoted to feed formulation; while the use of complete commercial feeds enables farm expansion in terms of bird numbers.

Use of commercial and self-compounded feeds: farmers' perceptions

Apantaku, Oluwalana and Adepegba (2006), investigated into poultry farmers' perceptions, preferences, and use of commercially compounded and

self-compounded feeds in the Oyo area of Oyo State, Nigeria. It was concluded that the poultry farmers prefer and use self-compounded feeds (SCF) for the following reasons: (a) self-compounded feeds were of better quality than commercially compounded feeds (CCF); (b) there are no quality control measures in the poultry feed industry in the Oyo Area; (c) CCF cost more SCF; and (d) farmers chose feed based on their perception of the feed quality, their technical ability to produce it by themselves, the cost of CCF, the storability of feed, and the cost and availability of transportation. Based on their findings, Apantaku et al., (2006) recommended that, interested public and private agencies should organise annual extension workshops and training for poultry farmers in the study area on (a) feed formulation; (b) feed ingredient mixing and compounding; (c) selection of ingredients, mixtures, and additives; and (d) the establishment, operation, and maintenance of feed mills. It was further suggested that farmers should be encouraged to form feed mill cooperatives.

Problems and challenges of poultry industry

The poultry industry worldwide is faced with problems and challenges, most important of which is the capability to satisfactorily feed the bird populations, and in turn feed the human populace. The demands of the poultry industry in developing countries in the tropics often tend to compete with the high human dependence on energy foods (cereal grains like corn and oil seeds) due to the inadequate production of such foodstuffs. Smith, (2001) found that, the poultry industry in developed countries has been possible because there has been surplus production of grains.

In Ghana, the intensive livestock production system embraces mostly commercial production of chicken. The intensive poultry production system is thus faced with certain problems and challenges, such as inadequate and high cost of inputs, particularly, quality feed in large quantities. Blount (1967) pointed out that, feed is the most serious challenge and the biggest single cost in poultry production. According to Smith (2001), the cost of feeding intensively-kept poultry represents 60 - 70% of total production cost. Oppong-Anane (2005) however, noted that in Ghana, poultry feed cost is generally higher, about 70 – 80 % of production cost, compared to other countries. This is so because market forces dictate prices of major feed ingredients such as maize, fishmeal and soybean meal. Quashiga (2003) reported that, the constant threat from input shortages, and cheap imports of poultry products which sell lower than local produce, have been a problem posing a fear of investing fully into the poultry industry.

The high feed production cost has led to some feed millers producing sub-standard feed, whose quality affects not only the products but also their selling price. Quaye (2005) reported that the feed mill industry is struggling with the unstable prices of feed ingredients such that, in the year 2004 alone, the price of maize changed eight times, whilst the price of fishmeal changed ten times. A major constraint to the expansion of the commercial feed supply sector, according to Balakrishnan (2001), is the small and highly volatile supply of quality feed ingredients that feed manufacturers often face. According to Oppong-Anane (2005), the quality of commercial feeds in Ghana could not be guaranteed even though the Animal Production Directorate (MoFA), Animal Research Institute, and the Ghana Standards

Board should have collaborated to regulate the quality of commercial feeds. The programme is yet to take off due to lack of logistics. Apantaku et al. (2006) also said that, the performance of the Standards Organization of Nigeria (SON) should be monitored and evaluated to ensure effective oversight of quality standards for agricultural products and inputs such as feeds and feed ingredients in Nigeria.

From a study conducted in peri-urban Accra and Kumasi Metropolitan areas, Okantah et al. (2003) found that the poultry keepers studied were satisfied with the service and quality of feed provided by commercial feed mills. Most farmers had limited knowledge or access to ration formulations. The poor extension coverage and low patronage of farmer associations implied limited access to information, goods and services for peri-urban poultry producers. The constraints associated with inputs such as feed availability, cost and quality, and marketing of produce, among others, posed a gloomy and uncertain future for the industry. Okantah et al. (2003) found it was important that farmers should be assisted with training and information, empowerment in the areas of feed formulations, formation of marketing groups and business management information. These would help to sustain small-scale production of commercial backyard poultry in peri-urban.

Quartey (2005) also noted that, marketing of poultry products has become a problem as a result of foreign competition brought about by the trade liberalization policy allowing the importation of subsidized poultry products. These pose a risk to local poultry production. Oppong-Anane (2005) stressed that, livestock and poultry marketing is a vital area and the success or failure of the marketing process, has a major effect on production.

Concerning institutional support (in terms of finance and credit), Oppong-Anane (2005), found that, loans with high interest rates requiring unachievable cash flows to manage repayment schedules, have led to unprecedented impoverishment, especially, of large and medium scale poultry farmers. The author further reported that, for the first time, the livestock sub sector of MoFA has a project with substantial credit facility to enable livestock farmers, processors and traders to access loans for various inputs and activities, including funds for stock water development. Osei (1990) found that, credit is essential for the implementation of projects or technologies and therefore recommended a 10% interest rate on loans for farmers.

CHAPTER THREE

METHODOLOGY

The study area: Location

Sekyere West District (SWD) is located in the Ashanti Region of Ghana, and is bounded by Ejura Sekyedumase in the north-west, Efigya Sekyere to the south-west and Sekyere East to the east (Fig. 1). The area comprises of four local councils namely, Nsuta-Kwamang, Beposo, Sekyere and Mampong. The District Agricultural Development Unit (DADU) has divided the district into three major zones namely, Jeduako, Asubuasu and Mampong. The district is comprised of 20 DADU operational areas.

The study sites

Poultry farmers in the district were identified in some of the DADU zones, however, majority of them were located in the Mampong zone or were clustered around it due to availability of some essential facilities. These included road network, litter and feed material from local industries, feedstuffs from farms and local markets, and building materials needed for the operation of the farms. The study sites were purposively selected from 10 DADU operational areas and comprised thirty towns and villages where poultry production activities are undertaken. Some of the sites were Mampong, Nsuta, Beposo, Yonso, Kofiase, Bosomkyekye and Kwamang. The locations of the study area and sites are shown on the map of Seyere West district in Figure 1.

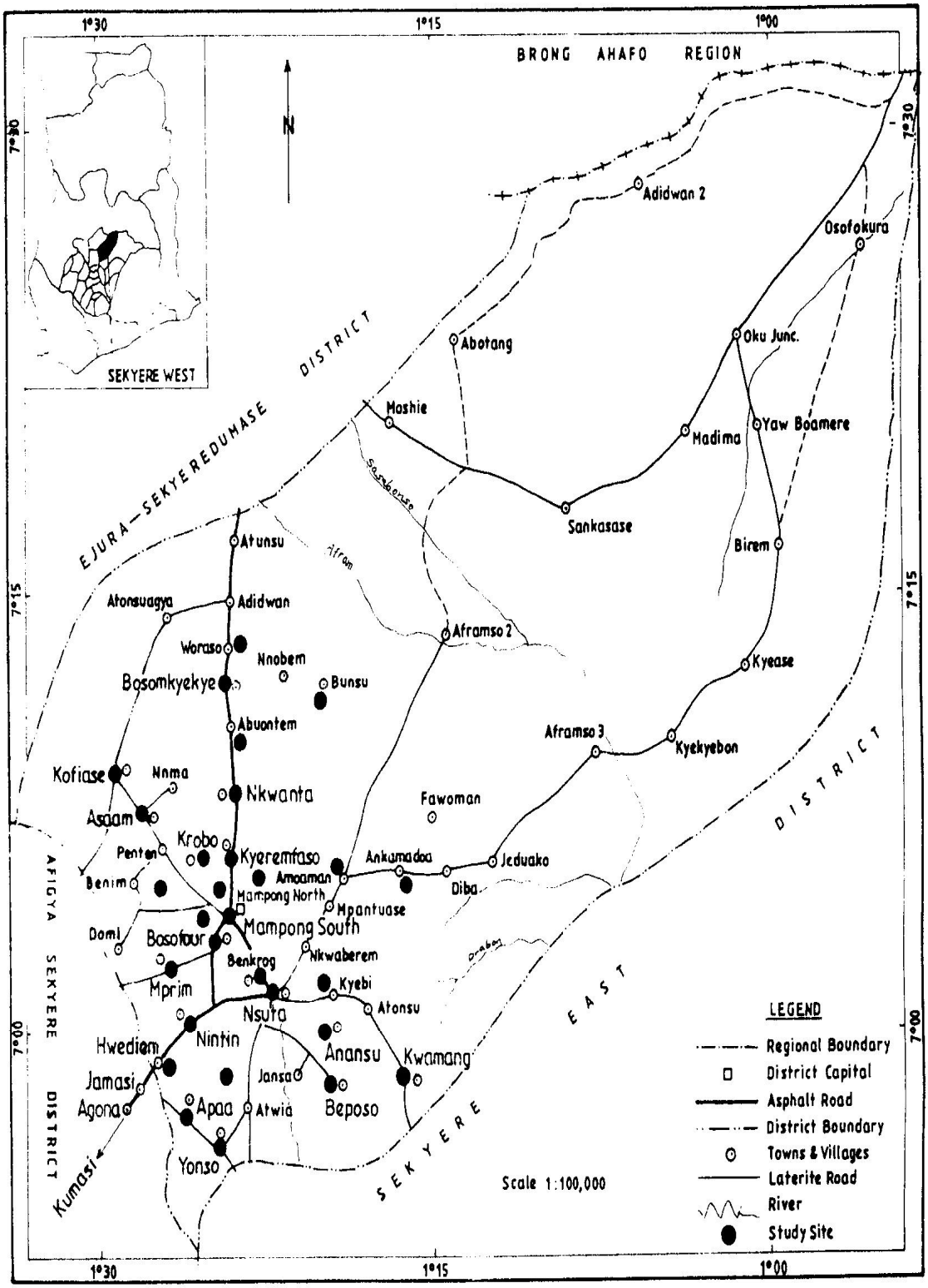

Fig. 1. Sekyere West District Map Showing The Study Sites.

Source: Statistical S ervices Department – SWD, 2006

Institutional Framework

The District Agricultural Development Unit (DADU) of the Ministry of Food and Agriculture (MoFA) located in Mampong has undertaken a lot of Interactive activities with the livestock (poultry) farmers in the study area and thus served as a source of information and assistance in this work. The Agricare feed supply outlet located in Mampong provided information on commercial feed use by the farmers.

Research design:

The study involved a preliminary survey and census of intensive poultry farmers and birds for an update; and a pilot study. A census survey involving an interview schedule was thus used for the study as follows:

Preliminary survey

The preliminary survey involved travelling through the operational zones to find out and familiarize with the people and places where poultry farms or feed agencies were. This was done in order to aid in the selection of the sites and farmers to be studied.

Preliminary poultry Census

A mini census on intensive chicken farmers was conducted to confirm or verify the actual current population size of both farmers and their flock sizes for use as the basis for sampling. The poultry farmers and the number of existing farms were counted in all the communities. The total numbers and flock sizes were recorded by June, 2006. Interviews and observation were

made to obtain evidence and information on previous and present census figures covering 2004 – 2006. Mini poultry census records of operating farms conducted in early January, 2004 was obtained from the District Veterinary Services Directorate (DVSD) office in Mampong. This was however inadequate for the study.

Population (Target or study population)

Bio-statistical data shows that the total human population for Sekyere West was estimated to be 85,105 people in the year 2000 (SSD, 2006).

The study population, however, involved all commercial poultry farmers in SWD; comprising layer, cockerel and broiler chicken producers, operating at small, medium and large-scale levels. Based on the preliminary poultry farming census conducted in Sekyere West District, the active poultry farmers were found to be 75 in June / July of 2006. The study based on this.

Sample size and sampling procedure

First, twenty intensive chicken farmers comprising 10 small-scale farmers and 10 large-scale farmers were selected randomly from the ten (10) operational areas in the district, using the stratified sampling procedure. The farmers in the district, based on the DVSD census frame, were first grouped into small-scale and large-scale farmers, according to the population of birds kept. Ten farmers (5each) were randomly selected from the 2 groups using the lottery method. This sample of farmers was used in a pilot study.

During the actual survey, however, it was found useful to include all the chicken farmers in the study, without sampling. A census survey,

involving 62 active farmers remaining in the district, excluding those pretested in the pilot study based on the mini census conducted, were studied.

Instrumentation: Questionnaire development

Two different interview schedules were developed for use in the study; one for interviewing the poultry farmers, and the other for obtaining information from the commercial feed supply agent in the district (Appendix A and B).

Pretest (pilot study)

The ten randomly selected farmers were interviewed during a pilot study to pre-test and validate the usage of the instruments in the actual collection. The instruments were found acceptable for the actual study; however, some corrections were made to improve upon it for use.

Training of enumerators

Ten enumerators from the DADU were trained for in two days in March 2007 and supported to administer the questionnaires to respondents and collect other vital information.

Data collection

The entire active population of chicken farmers and the commercial feed supply agent in Mampong were interviewed during the actual data collection exercise. The study was in two parts, so two types of survey data were obtained: First, information was obtained from the Agricare agency in

the district on records of the types and quantities of commercial feeds supplied and the number of chicken farmers obtaining the feeds monthly, from January 2004 to December 2006. These were used to determine the availability of commercial feeds to farmers and the level of patronage of farmers in the usage of commercial feeds in the district. Secondly, information was sought from the poultry farmers and the feed supply agent through personal interviews, using prepared interview guide. Items in the interview guide covered farmers' socio-economic status, awareness and perceptions of commercial feed availability and benefits derived by farmers in the district, as well as challenges faced by the farmers and the agent, with possible solutions.

Data analysis and presentation of results

The results of the survey were obtained by analysing data collected. Coding of variables and editing of the information preceded data entry onto a spreadsheet. Analysis was done using the Statistical Product for Service Solutions (SPSS) in 2007. Descriptive statistics (averages, frequencies and percentages) of the various items were used to further analyse the data. Tables and graphs or charts were used to show the distribution of results. The poultry census figures obtained were also tabulated and plotted on a graph to show the trend over the years. The monthly supply of commercial feeds (concentrates and mashes) to farmers as well as number of user farmers or farms were plotted to show their monthly trend and pattern over the three - year period (January, 2004 – December, 2006). Deductions were made based on the results, and inferences were drawn from literature.

Plate 2: Picture of Stakeholders during the forum held with farmers

Stakeholders' forum

As shown in Plates 2 and 3, a stakeholders' forum was held in April, 2007 and present were the poultry farmers in SWD, enumerators (AEAs from the DADU), representatives from the District Assembly, Agricare feed manufacturing factory and sales depot, and also the research student, under the supervision of two (2) senior lecturers from UCC, Ghana. The forum was to

inform participants about the purpose of the study, to open up a focus group discussion and to listen to the collective views of farmers to confirm the data collected. Some of the issues discussed were; why there was need for using commercial feeds in chicken production in SWD and whether commercial feed was beneficial to the farmers. It was also meant to discuss major challenges facing the farmers and feed supply agent and possible solutions, which might form the basis for future policy formulation or planning for the poultry industry in SWD and similar areas in Ghana.

Plate 3: Participants after Stakeholders forum held in Mampong

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter is concerned with the reporting, analysis and discussion of the findings. The chapter is divided into two main sections: background information of chicken farmers and discussion of objectives and research questions.

Background information of chicken farmers

In this study, 62 farmers were used. Out of this number 54 (87.10%) of them were males and 8 (12.90%) were females. The youngest male farmer was 27 years old whilst the oldest was 87 years. The female farmers ranged between 31 and 60 years of age. In terms of religious affiliation, 53 (85.48%) were Christians, five (8.06%) were Moslems, two (3.22%) were Traditionalists and another two (3.22%) were Atheists or none-worshippers. This shows that, there was no religious objection or taboo. In relation to the educational status of the poultry farmers, 7 (11.29%) had Tertiary education, 15 (24.19%) had secondary or technical education, 36 (58.06%) had basic formal education and 4 (6.45%) of them had no formal education. Also, 45 (72.58%) of them had some form of training in feed formulation but 17 (27.42%) did not and so may be considered for training. Furthermore, 40 (64.52%) of the farmers regarded poultry farming as their primary occupation whilst it was secondary occupation for 22 (35.48%). This is shown in Figure 2.

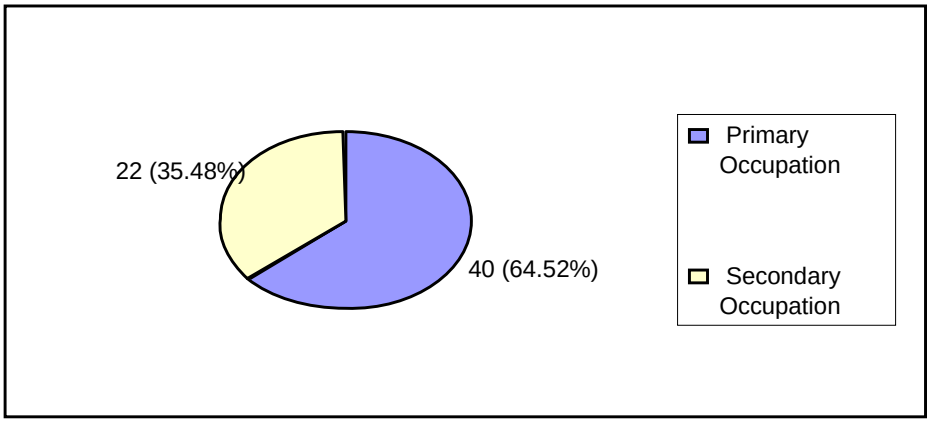

Figure: 2. Occupational status of chicken farmers in SWD

Source: Field data 2007

When the respondents were asked to specify other occupations apart from poultry, some mentioned teaching, accounting, electrical, and clerical jobs; others stated crop and livestock farming, provision of transport services, trading, tailoring and corn mill operating. In another development, the respondents were asked about the combinations of birds they kept. Eighteen (29.03%) of the farmers kept layers, broilers and cockerels. Another 18 (29.03%) kept layers and broilers, four (6.45%) kept layers and cockerels and two (3.23%) kept broilers and cockerels. Interestingly, 17 (27.42%) kept layers only, while three (4.83%) kept broilers only and no farmer kept cockerels only.

In relation to years of experience in poultry keeping, 18 (29.03%) of the farmers, fell within the range of 6 – 10 years. This was followed by 14 (22.58%) farmers who fell within the range of 0 – 5 years from the inception of the commercial feed outlet in Mampong. Table 1 shows the distribution of respondents' poultry farming experience in the study area.

Table 1: Years of experience of farmers in poultry keeping

Years in poultry keeping	Frequency	%
Above 20 yrs	12	19.35
16 – 20 yrs	9	14.52
11 – 15 yrs	9	14.52
6 – 10 yrs	17	27.42
0 – 5 yrs	15	24.19
Total	62	100.00

Source: Field data, 2007

From Table 1, the 15 (24.19) new entrants indicated that they had entered the poultry farm business as a result of the availability of commercial feed in the district while the other farmers indicated that they were sustained by it.

On the scale of production, 34 (54.83%) operated on medium scale, 17 (27.41%) operated on small scale and the rest (11 or 17.76%) of the poultry farmers interviewed operated on large scale. This is illustrated in Figure 3.

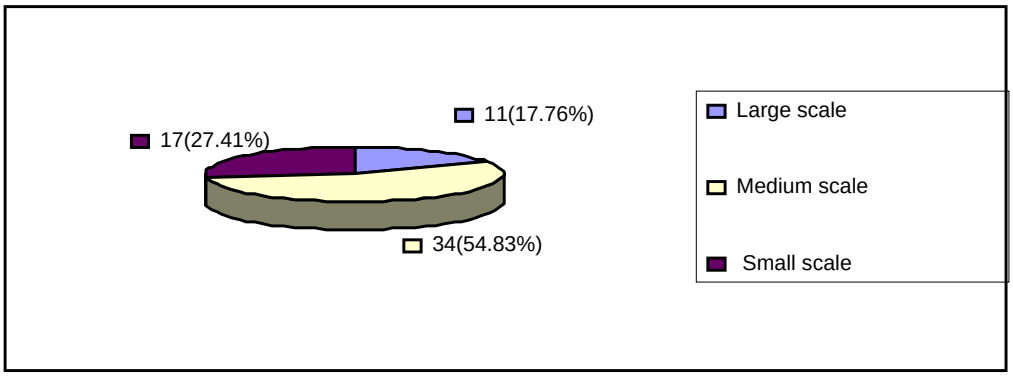

Figure 3: Scale of production of chicken producers

Source: Field data, 2007

Findings and discussion of objectives and research questions

The purpose of the study was to assess availability of commercial feed as a factor in chicken production in SWD. It was also meant to determine the availability and level of patronage of the feeds, the benefits derived, the challenges and possible solutions identified by the poultry farmers. The findings and discussions of objectives are done under four main headings.

The extent of availability of commercial feeds and usage in SWD

Agricare commercial feeds, in the form of concentrate and mashes, were supplied in the range of 100 - 200 bags (50kg/ bag) per month for broilers, cockerels and layers at different levels of production were made readily available at the outlet in Mampong and sold to the farmers daily.

The major sources of poultry feeds purchased by farmers in the district was obtained and analysed. Table 2 shows that 27 (43.55%) of the farmers purchased feed from Agricare agency at Mampong by 2007. These farmers indicated that they had completely stopped making long distances in search for feed and therefore obtain commercial feeds solely from Mampong.

Table 2: Major sources of feeds obtained by SWD farmers by 2007

Location	Feed agency / outlet	Farmers	%
Mampong	Agricare	27	43.55
Jamasi	Gafco / Agricare	17	27.42
Kumasi	Agricare, Gafco, Vaks, Darko, etc.	18	29.03
Total		62	100.00

Source: Field data 2007

In order to confirm the quantities of feed obtained from Agricare and used by the poultry farmers in the district, records of 50 kg bagged feeds purchased, were taken and analysed (See Appendix C). From the monthly patronage records in Appendix C, a line graph was constructed to show the monthly trend of quantities of concentrates and mashes purchased and used by the farmers during the three year (2004 - 2006) period studied. This is shown in Figure 4.

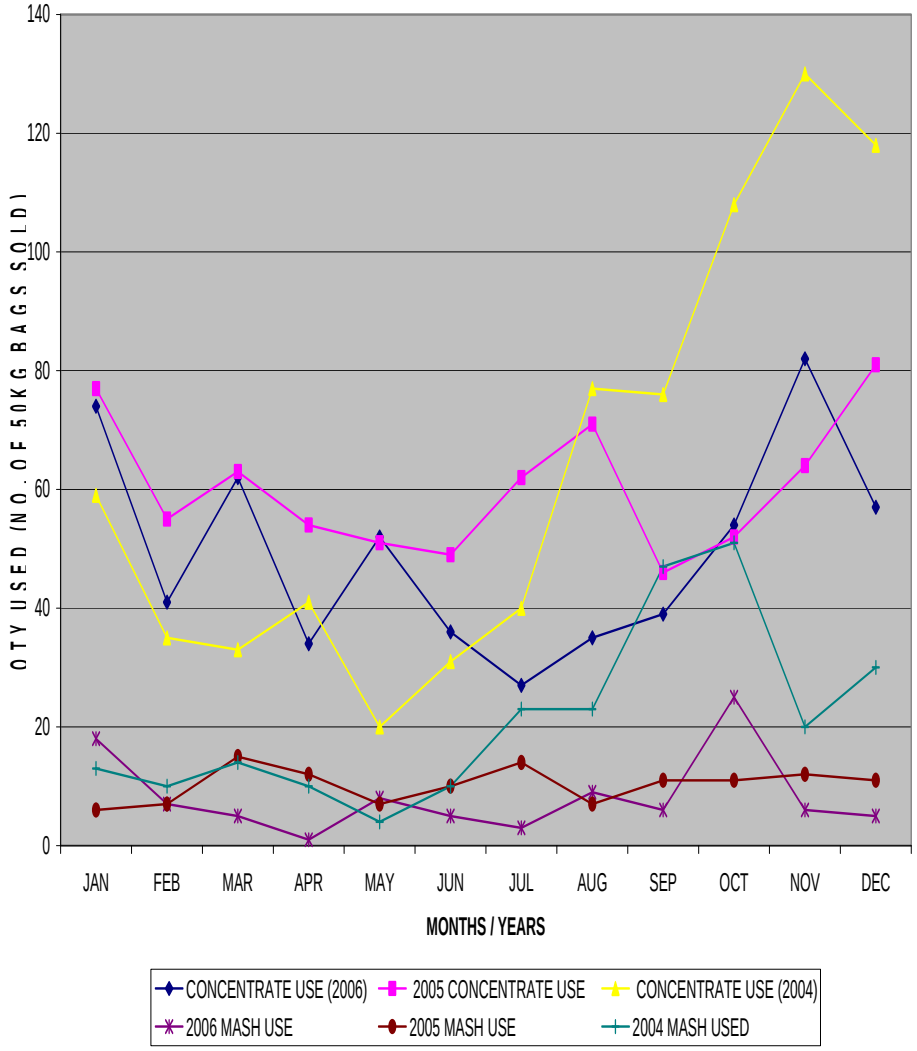

Figure 4: Quantities of feeds obtained from Agricare (2004 – 2006).

Source: Field data, 2007

Figure 4 depicts that the monthly quantities of concentrates bought by the farmers ranged from as low as 20 bags in May, 2004 to as high as 130 bags in November, 2004. (Figure 4) It was observed that the monthly quantities of feeds used, generally took a trend of rise and fall patterns. The quantities of mashes used by the farmers also followed a similar pattern. The monthly quantities of mashes bought by the farmers also ranged from as low as four (4) bags in May, 2004 to as high as 51 bags in October, 2004. In 2005, the minimum value was six (6) bags in January and the maximum was 15 bags in March, 2005. The 2006 values were one (1) bag in April and 25bags in October. The trends for Mash values were generally lower than the concentrates possibly because chicks usually fed with the mashes consume smaller quantities than the growing and laying birds usually fed with the concentrates. The low monthly values of feed quantities for some months could be attributed to periods when birds, especially broilers, were nearing finishing stage or when small numbers of chicks were being kept during those months in the three years studied.

The reason why the 2004 values are higher than those of the 2005 and 2006 was possibly due to inception of the newly introduced feed outlet in the district could also have attracted most of the farmers to try the innovation for the first time. Concerning the low seasonal values observed, Yankah (1994) reported that, the availability of cereal grains declines and runs out shortly after the peak period of production between the months of September and December. As a result, the prices of ingredients including wheat bran increase a lot. Consequently, increased prices of ingredients affect feed cost with subsequent reduction purchase by farmers.

The subsequent annual results of feed usage were plotted into a bar chart in order to simplify the procedure and allow each year's feed patronage to be pictorially understood. This procedure reveals a downward annual trend of Agricare feed patronage. The trend of Agricare feed patronage thus indicates that there was a decline in the use of commercial feeds (mashes and concentrates) supplied from 2004 to 2006. The values for the mashes declined annually, from 255 in 2004 to 123 in 2005 and then to 98 bags in 2006. The total quantities of concentrates used in the three successive years were also 768 bags in 2004, 725 in 2005, and 593 bags in 2006, respectively. This is shown in Figure 5.

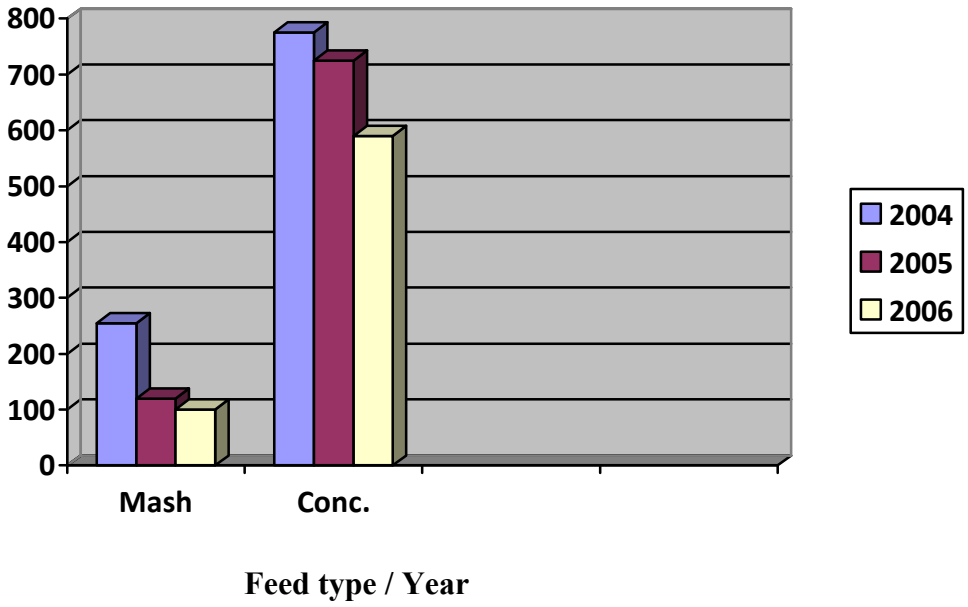

Figure 5: Annual total quantities of feeds obtained from Agricare.

Source: Field data, 2007

Evidence from the farmers revealed that there were some major hindrances that led to the annual decline. Among others, poor market

opportunities as result of the threat of bird flue disease, financial constraints and shortages of ingredients such as maize throughout the country leading to high cost and unaffordable feeds, were identified during the period. This was confirmed by all the farmers, especially, 15 (24.19%) farmers who became inactive and stopped production periodically between 2004 and 2006. Furthermore, these 24.19% farmers indicated they did not experience any improvement in production during the period of study due to the afore-mentioned hindrances and challenges. The hindrances must therefore be looked at seriously to find workable solutions which will allow positive effects of feed availability to be felt and sustained.

In line with the foregoing statements, Quartey (2005) reported that, the scare of the Bird flu disease as well as the trade liberalization policy which allows the importation of subsidized poultry products has become a problem in poultry production and marketing. Okantah et al. (2003) also observed that, constraints associated with inputs such as feed cost, quality and availability, as well as marketing of produce, among others, pose a gloomy and uncertain future for the industry. With regard to the shortages and high cost of feeds and ingredients, Quaye, (2005) reported that the feed manufacturing industry in Ghana was saddled with the unstable prices of feed ingredients, because in the year 2004 alone, the price of maize changed from 170 to 250 Ghana cedis / 1000kg eight successive times; whilst the price of fishmeal also changed from 240 to 650 Ghana cedis / 1000kg ten times. This subsequently affected the cost and price of commercial feeds produced. With the problem of financial constraints, Osei (1990) found that credit is essential for the implementation of projects. However, Oppong-Anane (2005) reported that, loans with high

interest rates requiring unachievable cash flows to manage repayment schedules, have led to unprecedented impoverishment, especially, for large and medium scale poultry farmers leading to the collapse of some farms.

Measures instituted by Agricare to ensure availability, maintenance of quality and affordability of the feeds

Agricare instituted measures to ensure availability, quality control and affordability of the feeds sold to the poultry farmers.

First, prompt action was taken to ensure that all feed types required by the farmers were readily available in stock, through effective communication with the suppliers at the factory. Also, Agricare, in October 2006, changed the inclusion rates of the concentrate feeds from 30% to a higher quality of 25% concentrate, to improve upon quality and easy formulation of the feeds to enhance poultry production by the farmers. Layer concentrates, in particular, were given premium quality which would take care of the needs of the laying birds, especially, in terms of high ambient environmental temperatures.

To maintain quality and wholesomeness of the Agrifeeds, bio-security measures were employed especially at the storage and sales points by ensuring that the feeds were not displayed in the open under the sun, while ensuring maximum ventilation. However, optimum dryness ensured, prevented serious problems of moulds and mycotoxin growth. Contamination of the stored feeds by rodents and other creatures was also controlled at the Agricare outlet to help avoid spillage and prevent wastage of the expensive feed. By 2007, a state-of -the-art fully automated and computerized Buhler feed plant was installed to enhance production of high quality commercial feeds (mashes,

pellets and concentrates). This in addition, made the feeds readily available at all times to the farmers in the district. In line with the installation, Smith (2001) speculated that, in future, computers will not only be used to formulate least cost diets but will also be used in modeling, so that the response of the bird, in terms of growth and development, will be taken care of when formulating the diet. This implies that it will be more advantageous to rely on computer programmers in feed formulation and manufacturing.

Concerning the affordability of commercial feeds, Ensminger (1992), also found that, the commercial feed manufacturer enjoys a distinct advantage of economies of scale which enables the manufacturer to produce and sell at cheaper prices to the customers, thus, making the feeds affordable. Furthermore, Agricare ensured that feeds were made affordable to farmers by sticking to stipulated depot prices and monitored the selling prices at the sales points. From time to time, short term credit sale of feed was offered to trustworthy farmers by the agent to assist them. Small quantities less than 10kg were retailed to farmers with small numbers of birds at the feed sales outlet in the district. This method also had a positive effect on the free range system of poultry production in the communities leading to farm expansion.

The result of the measures to ensure feed availability and affordability was that, making feed available and affordable to the poultry farmers from the Agricare outlet in Mampong led to farm expansion in the commercial production of chicken (especially cockerels) in the district. This is evident from the annual total chicken populations in SWD which increased from 77,210 birds in 2004, to 86,770 birds in 2005 and then, to 100,360 in 2006. This is shown in Table 3.

Table 3: Annual chicken population in SWD (2004 - 2006)

Year	Total bird (chicken) populations			
	Layers	Broilers	Cockerel	Total
2006	48,460	13,200	38,700	100,360
2005	44,520	12,300	29,950	86,770
2004	44,960	11,750	20,500	77,210

Source: Field data

In order to understand and appreciate the outlook of cockerel enterprise production improvements, a bar chart was plotted as depicted in Figure 6.

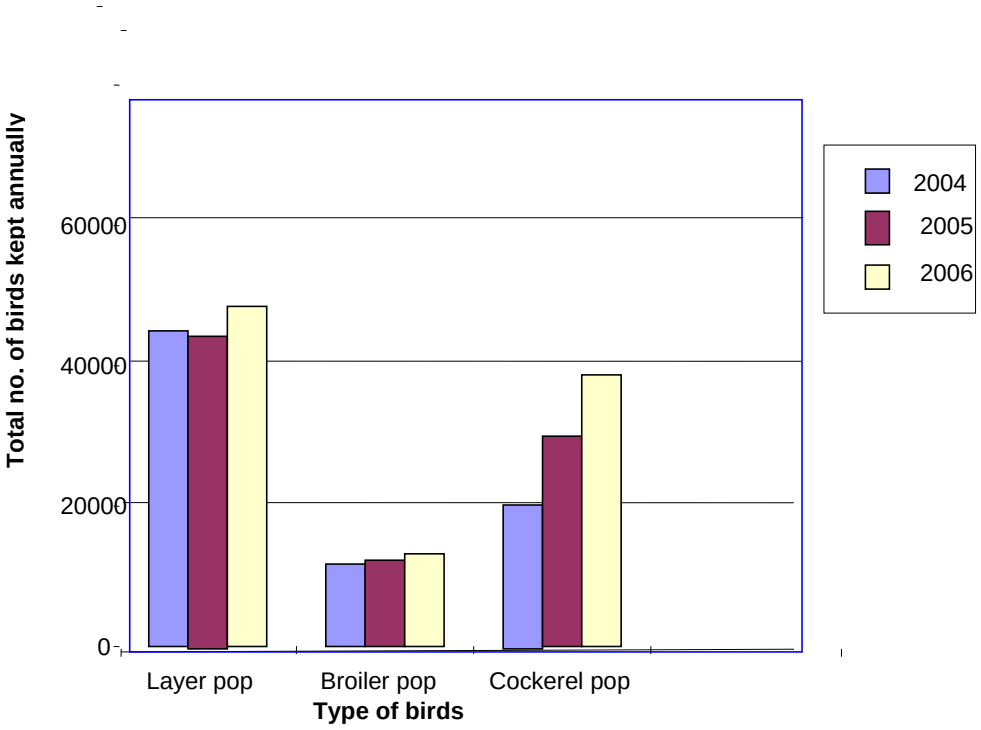

Figure 6: Annual total chicken enterprises bird numbers (2004 -2006)

Source: Field data, 2007

From figure 6, cockerel populations rose steeply annually from 20,500 in 2004 birds to 29,950 birds in 2005 and to 38,700 birds in 2006. The annual increases in layer and broilers were rather minimal. Though cockerels were primarily used to upgrade local chicken, the spectacular increases in annual production of cockerels, exhibited in figure 6, seemed to indicate a growing interest in home or village chicken meat production using cockerels in SWD. Similar events were observed in the peri urban areas of Accra and Kumasi Metropolis. Okantah et al. (2003) reported that layer production appeared to be the core poultry activity and a long-term, steady business while the large-scale production of cockerels was an interesting development as in SWD. Thus, the fact that cockerel production seems to be a year-round activity, with little emphasis on seasonal production suggests a steady demand for this type of bird. It can therefore be emphasized that, the commercial feed supply sector had positive effects on the development of both the intensive production of chickens as well as the traditional (extensive) production sector which is in line with observations made by Wilson (1995).

An observation made was that, in spite of the decreasing population of farmers, from 2004 to 2006, bird populations kept on increasing. The continuous use of commercial feed by the farmers led to successes and farm expansion. Ensminger, (1992) noted that, using complete commercial feeds enable farm expansion in terms of bird numbers to be achieved. Self compounding of feeds, on the other hand, restricts bird numbers as it requires more time and capital in feed preparation or manufacturing. It can therefore be concluded that the use of the commercial feeds by most of the farmers made it possible to increase their bird numbers, leading to farm expansion.

Benefits derived from commercial feed use by SWD farmers

The benefits attained by the poultry farmers, were perceived to have been derived as a result of commercial feed availability in SWD. Some of the benefits are reported and discussed in terms of feed types preferred and used by the farmers, improvements made in production such as reduction in feed cost of production leading to farm expansions and developments made in farm operations due to the establishment of the commercial feed outlet in SWD.

Feed types preferred and production improvements made

Majority, 55 (88.71%) of the poultry farmers studied, preferred commercial feeds to self formulated diets. Among the seven (11.29%) who preferred self formulated feed, four (6.00%) were among the 11 (17.76%) large scale poultry farmers, who kept 2000 to 7000 birds. It means that, the commercial feed users included large, small and medium scale farmers. Hamre (2005) recommended that, birds should be fed a complete diet from a feed supplier, or if possible, mix one's own diet by preparing the appropriate ration from a concentrate, following the directions of the supplier.

The reasons given the poultry farmers for their preference for commercial feeds were: reliability and regularity in supply, good quality, affordability, availability and easy usage and its assured safety from contamination of the feeds. The farmers emphasized that better and consistent results could were attained by using commercially formulated feeds. With regard to the ready availability and easy usage, the outcome of the stakeholders' forum held with the farmers in Mampong – Ashanti, confirmed that almost all, 90.00%, of the poultry farmers, agreed that, using commercial

feed was profitable. To the farmers, commercial feed was also preferable because it is more readily available than looking for feed ingredients used for self compounding, which tends to be a seasonal problem in the district, as also observed by Yankah (1994). Ensminger (1992), made a point that, feed laws in a country govern and thus protect commercial feed users from contamination and losses. Speedy (2001), also stressed that specialization of feed mills was as an important identified step to avoiding cross-contamination of feed materials. It was however found that, 31 (50.00%) of all the farmers studied used commercial feeds whilst 5 (8.00%) used self compounded feed and 26 (42.00%) used both formulations from time to time. Okantah et al. (2003) found that, some farmers including those who use home-mixed rations admitted that they added a purchased concentrate to other feed ingredients. Furthermore, the authors found that, 50% of the farmers they studied were satisfied with the services and quality of feed provided by commercial feed mills in their study area.

For the self-formulated feeds, five (8.06%) farmers out of the seven (11.29%) poultry farmers who preferred using only self-formulated feeds gave the evidence that, even though self formulated diets could be cheaper, the quality was difficult to assess. The rest, two (3.22%), based their reasons for usage on personal preference. The 11.29% farmers, agreed that it was often difficult coming up with a ration or even assessing the quality of the ingredients to be used. This issue was further confirmed, during the forum by 10.00% of the poultry farmers who stressed that though many problems are involved, it could be profitable as the commercial ones and even cheaper. Interestingly, the first major reason given (cheap feeds) for using self

formulated diets is similar to that of the farmers in Oyo State in Nigeria, reported by Apantaku et al (2006); that commercially compounded feeds cost more than self-compounded feeds.

To add to that, the users of self formulated feeds in this study were in the minority, 11.29% whilst those who preferred and used commercial feeds were in the majority 88.71% in SWD, in Ghana. The findings in this study, thus, were in direct contrast to what pertains in Oyo State in Nigeria, where the majority of the farmers used and had a high preference for self compounded diets. Concerning self formulated diets, Balakrishnan (2001) however, noted that, even though there is a high level of integration in India, a substantial quantity of feed is prepared by the farmers to reduce cost. However, Duvauchelle (2006) cautioned that, even though self formulated feed may be cheaper, the extra time and energy required and the risk of malnutrition or overdosing with some ingredients, means that, unless one is adequately knowledgeable it would be better to stick to commercial feed. From the foregoing statements, it can be certain that commercial feed availability certainly led to some benefits.

The SWD farmers made several improvements by using Agricare feeds in production, as a result of the availability of the commercial feeds in the district. Concernig the extent of production improvements made, 48 (77.41%) farmers, among the 55 (88.71 %) commercial feed users, indicated that, the availability of commercial feeds in the district improved their production to various degrees while seven (11.29%) farmers, could not identify any improvement in production. Furthermore, 74% of the poultry farmers in SWD attested to the fact that they made some improvement during the period from

2004 to 2006; compared to 2003, when the commercial feed outlet in Mampong had not been established. About two percent of the farmers were indifferent or not sure of the extent of improvements made. However, the 15 farmers (24.19%) said they did not experience any improvement during that period due to certain challenges faced. This is shown in Table 4.

Table 4: Improvement in production by farmers from 2004 -2006

Any improvement in production?	Frequency	%
Yes	46	74.19
No	15	24.19
Indifferent	1	1.62
Total	62	100.00

Source: Field data, 2007

From table 5, some of the improvements made by 46 (74.19%) of the poultry farmers interviewed were identified and prioritized by them in decreasing order of merit as follows:

1. Increased bird populations from 2004 to 2006 above the previous years
2. Less time spent looking for feed so enough time for family and poultry
3. Expansion in sizes of farm buildings / structures
4. Improved bird performance and marketing, with achievement of targets
5. Self dependent, able to reinvest capital in poultry.

Production cost reduction and developments made in farm operations

Concerning developments made in poultry farm operations, 55 (88.71 %) poultry farmers perceived that some developments had occurred as a result of the availability of commercial feeds near to their vicinity. This was confirmed by again by 90.00% of the farmers at the forum held in Mampong.

The developments made in farm operations mentioned, were: reduced time spent in obtaining or preparing feeds for the birds, uniformity in growth of birds, timely feeding and avoidance of mistakes that might occur in self formulation. Also balanced diet which was offered even when one was uneducated in feed formulation and morbidity, mortality and disease incidence were kept low with minimum medication; and labour cost had **r**educed. Concerning improvement in timeliness of farm activities, 58.00% of the poultry farmers said they were successful due to the establishment of the feed outlet in SWD. They indicated that: they had sufficient time for other farm duties, more time to attend to their birds and since feed was available at any point in time their transportation costs and time spent travelling had reduced as such feeding of bird is currently timely. Five factors that led to reduction in feed cost in production were identified, however; commercial feed availability in SWD was prioritized by a greater proportion 27 (49.09 %) of the farmers whose major source of feed was Agricare Mampong, as a major factor which helped them to make successes. The four other factors which further cut down their cost of feed in production included: obtaining correct feed at the right time, avoidance of high interest loans, obtaining feed early with low travel risk and also self produced maize were mentioned. The prioritized levels of factors leading to the 55 farmers' success in feed cost reduction are shown in Table 5.

Table 5: Factors that led to farmers' success in cutting down feed cost

Factors to lower feed cost	Frequency	%	Order of merit
Commercial feed availability in SWD	27	49.09	1st
Correct feed at right time	12	21.18	2nd
Avoidance of high interest loans	8	14.54	3rd
Obtain feed early with low travel risk	7	12.72	4th
Self produced maize	1	1.18	5th
	55	100.00	

Source: Field data, 2007

Similarly, Yankah (1994) mentioned availability and cost of feed ingredients, and other costs of production such as transportation, handling and storage of raw materials, as some of the factors contributing to the high feed cost of feed. The cost of poultry feeds could therefore be reduced with less freight charges.

Major problems / challenges identified by the poultry farmers in SWD

Generally, the farmers in the district had major challenges for which they also had possible solutions. The problems or challenges which came out through personal interviews were prioritised and outlined by the farmers in decreasing order of importance as follows.

i. Lack of finance or credit and difficulties in expansion
ii. High cost and unavailability of some feeds and ingredients and drugs
iii. Poor quality of day old chicks (DOC) leading to high mortalities.
iv. Threats of diseases outbreaks such as Bird flu scare, Gumboro, etc.
v. Costly and unavailable vaccines in the district

vi. Theft, water and housing problems, lack of farm transport

vii. Lack of dedicated labour

viii. Poor product marketing channels and bad debts caused by non paying customers.

ix. There is poor Veterinary/Animal Production (AHPD) extension and farmer linkage, leading to low level of farmer know-how.

Okantah et al. (2003) reported that, although backyard poultry production plays an important role as the main or secondary occupation for the peri-urban farmers, small-scale poultry producers are confronted with several problems. The constraints faced by farmers were also associated with inputs such as feed availability, availability of day-old chicks, cost and quality and marketing of produce among others and concluded that these posed a gloomy and uncertain future for the industry. Quaye (2005) observed that the high cost of feed was due to poor food security in the country, since neighboring countries come in to buy our maize while we go back later to buy the same maize at a higher price. Oppong-Anane (2005) reported that, in Ghana, poultry feed takes about 70 – 80 % of the poultry production cost, and that the cost is generally higher in Ghana compared to other countries; because, market forces dictate prices of ingredients (e.g. maize, fishmeal and soybean meal) and make them easily unavailable. The high cost has led to some farmers or feed millers producing sub-standard feed, which affects not only the quality of final output but also the selling price of the products.

Technically and financially, Okantah et al. (2003) observed that, the limited range of feed ingredients, lack of feed, advice and farmers' limited

knowledge in ration formulation would result in poor feeding of chickens and poor productivity. Guaye and Hooft (2002) reported that, many farmers do not have the knowledge to manage their birds nor do they have the means (finance) to feed their birds. Farmers should therefore be given assistance through training and financial support.

Furthermore, Oppong-Anane (2005) observed that, livestock and poultry marketing is a vital area and the success or failure of the industry depend on it because, the marketing process has a major effect on production and that, inefficient marketing system causes producer and consumer losses. Appiah, (1993) observed that while some poultry farms were expanding others were being forced out of business as a result of major threats like disease outbreaks, poor feed supplies and other problems. Quartey (2005) emphasised that, marketing of poultry products has become a problem as a result of foreign competition brought about by the trade liberalization policy and the importation of subsidized poultry products; and also identified the scare of the Avian Influenza (bird flu) disease as also posing additional risk to poultry production. There is the need, therefore, to look at the challenges critically, especially, the first four major ones mentioned by the poultry farmers, in order to improve upon and sustain the poultry industry.

Suggested solutions or strategies prioritized by farmers in SWD

The farmers suggested the following solutions and strategies in order of importance as follows.

i. The farmers should be provided with long-term, low-interest and timely loans through the Banks in order to purchase inputs especially feed, drugs and

other farm needs. Credit may be provided in the form of finance for the farm inputs. Also, farm transport must be provided on credit just as tractors are sold on credit to crop farmers. These will help the farmers to expand their farms.

ii. The Government of Ghana through MoFA should import and subsidise poultry feed ingredients and drugs; and also, support maize production in the country. Maize must be bought from farmers, stocked and resold to poultry farmers during the off season.

iii. The Food and Drugs Board must also collaborate with MoFA, FBOs and feed manufacturers to enforce and ensure feed quality control and pricing policies for poultry feeds.

iv. The Government through MoFA in conjunction with the hatchery operators must enforce measures to control quality and prices of the DOCs to ensure improvement in the production of the birds.

v. MoFA in conjunction with FBOs and dealers must ensure availability of vaccines and drugs in the district MoFA offices and veterinary drug stores; and also help farmers to improve or promote farm sanity.

vi. The government of Ghana through the legislation board must also ban poultry meat importation to create local markets for poultry products such as meat and eggs.

vii. MoFA and FBOs / stakeholders must enforce by-laws to control theft of livestock farm animals and equipment.

viii. Government through MoFA must train and employ more Veterinary and Animal Production staff to educate farmers or farm labour and encourage them to become knowledgeable and dedicated to the poultry business.

Oppong-Anane (2005) reported that, loans with high interest rates requiring unachievable cash flows to manage repayment schedules have led to unprecedented impoverishment, especially, for large and medium scale poultry farmers. Osei (1990) however, found that credit is essential for the implementation of projects or technologies so farmers should be supported with soft leased loans with low interest rates and recommended 10% interest rate on loans for farmers.

Agbesi (1981) noted that, the importation of concentrates, premix and other feed additives add to cost of production. Therefore, feed millers should produce a percentage of their maize requirement to reduce the cost of production of feeds to make feed affordable. Okantah et al. (2003) noted that, poultry farming is important in peri urban livelihood and emphasized the important to assist the farmers with training and information in the areas of feed formulations and formation of marketing associations or farmer based organizations (FBOs). This would go a long way to sustain poultry activity in peri-urban environments.

Report of stakeholders' forum held at Mampong

A stakeholders' forum was held in the month of April, 2007 at Mampong-Ashanti, SWD. A total of 40 participants including the enumerators, some of the SWD poultry farmers, Agricare representative, commercial feed agent in SWD and the research student, under the supervision of two senior lecturers from the University of Cape Coast (UCC), Ghana were present. This was to confirm the results of the data collected. Some of the issues discussed were the factors that would determine the purchase of

commercial feeds. Also, the situation under which a farmer may be compelled to use inappropriate feed even though a farmer might know that poor feed and diseases cause low productivity. Other issues were why there was need for using commercial feeds in poultry production in SWD and whether commercial feed use was beneficial to the farmers. Many, 65.00%, farmers present agreed that, lack of finance to purchase the required feed rather than lack of knowledge prompts them to resort to poor feeds. About 15.00% of the farmers were indifferent or unsure about the situation with credit and finance. Concerning availability and the benefits from commercial feeds, majority, 90.00%, of the farmers confirmed that with commercial feed currently at their doorstep, the problem of unavailability of the feed ingredients has been removed. The 90.00% farmers said that using commercial feed was profitable and was preferable because of the consistency in its supply and quality, and also due to its capability to solve the question of unavailability of feed ingredients. The farmers however complained about the high cost and frequent price increases in the feeds and asked the Agricare's representative if there could be a reduction in the prices of the feeds. The others, 10.00% said self formulated feed was equally profitable and cheaper in spite of the numerous problems that might result consequently.

To end it all, the farmers were advised to regularly contact the livestock extension officers from the very beginning of their planning for the poultry enterprises. In agreement with Okantah et al. (2003), associations such as farmer based organizations (FBOs) should be a means of empowering poultry farmers. This will give them greater influence not only in obtaining inputs (feed) but also in obtaining satisfactory prices for their products.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

From the results obtained, the following summaries could be made:

1. The level of commercial feed availability in the district stood high, above farmers' demands, ranging from 150 – 200 bags of concentrates and mashes (50kg/ bag) per month per year. The feeds were made readily available at the outlet in Mampong to be sold to the farmers daily. The farmers at the stakeholders' forum confirmed that commercial feed, currently at their doorstep, has removed their problems of unavailability of feed ingredients. As at 2007, quite a high proportion 27 (43.55%) of the respondents identified Agricare in Mampong as their sole main source and had completely stopped making long distances for feed. Though the rest used the outlet occasionally, the 18 (29.03%) who travelled very far for feed must be looked at. The quantities of Agricare feed (concentrates and mashes) use by farmers showed spectacular monthly trend and annual total increases in 2004 than 2005 and 2006. The highest peak values of feeds purchased monthly during the three years were 130 bags in November, 2004 for concentrates and 51 bags in October 2004 for mashes. These peak values, totalling 181 bags were even lower than could be supplied at the outlet. The Annual total patronage of the feeds however declined in the two subsequent years.

2. Agricare employed bio-security measures to maintain quality of the feeds and also ensured prompt availability of feeds to the farmers. Partial credit was sometimes offered to trustworthy farmers when necessary. Furthermore, small quantities of feed were retailed to small poultry holders' to make feed affordable to the farmers at the recommended depot prices. Feed quality was improved by installing a plant. These measures to improve availability and affordability led to increases farm expansion in terms of bird numbers or populations, especially among cockerels. Annual total chicken populations in SWD increased from 77,210 birds in 2004, to 86,770 birds in 2005 and then, to 100,360in 2006. Cockerel populations rose steeply annually from 20,500 in 2004 birds to 29,950 birds in 2005 and to 38,700 birds in 2006. The annual increases in layer and broilers were rather minimal. Though cockerels were primarily used to upgrade local chicken, the spectacular increases in annual production of cockerels, seemed to indicate a growing interest in home or village chicken meat production.

3. The availability of commercial feed in SWD from 2004 has resulted in numerous benefits such as improved production attained by 48 (77.41%) farmers. Cost of production has been reduced by 27 (49.09 %) farmers with a resultant increase in bird productivity and chicken production. 15 (24.19) farmers entered chicken production as a result of the establishment of the feed depot in the district to take advantage of it. Most farmers currently spend less time obtaining feeds for their birds, and have made improvement in farm operations, also and were able to create more jobs in the poultry and feed sectors for new entrant farmers other allied workers.

4. Some of the major challenges faced by the poultry farmers in Sekyere West District (SWD) were: lack of finance on the part of farmers, unavailability and high cost of some feeds, ingredients and poultry drugs; threat of diseases like Avian Influenza; poor Veterinary or Animal Production - extension and farmer linkage, which led to low level of farmer know-how and collapse of some farms.

Conclusions

Based on the findings from this study, the following conclusions could be drawn:

1. The availability of commercial poultry feed in SWD led to sharp increase in number of farmers engaged in poultry farming in 2004, the same year that the commercial feed depot was established in the SWD. The 15 (24.19) new entrants and other farmers, emphasized the point that, the availability of commercial poultry feed in SWD helped them to engage in poultry and sustained them. The increased number of poultry farmers, associated with the establishment of the commercial feed outlet in 2004, was possibly enhanced by the ready availability of commercial feed. The financial support (FABS/CIDA), advice to farmers by MoFA, a ready market for poultry and eggs and profitability of the enterprises might have contributed to the spectacular monthly trend increases in the quantities of feed purchased in 2004. Even though feed quantities purchased reduced annually after 2004, the decline in feed purchased did not affect bird numbers. Challenges such as lack of finance, high cost and unavailability of some feeds and ingredients as well as the scare of Avian Influenza (Bird Flu) disease and poor quality day old

chicks could be largely responsible for some farmers exiting from poultry production during the three year study period. There is therefore the need to deal with the challenges that brought about the decline.

2. It was realized that the quality of feeds supplied by Agricare was not compromised and even though the prices were unstable, the maintenance of feed quality, ensuring feed availability and retailing feeds in affordable small quantities had a positive influence on poultry production. Meeting the needs of the poultry producer stimulated production and led to farm expansion.

3. There were a lot of hindrances which resulted in the decrease in number of poultry farmers in the district and quantities of feed purchased after the year 2004. The first four challenges identified by farmers in this study therefore, need to be tackled seriously so as to encourage the youth and other interested farmers to engage in poultry farming to ensure the growth and sustenance of the enterprise.

4. Even though there were challenges, the farmers identified derived important benefits from the establishment of commercial feed outlet in the district. Up to 55 (88.71 %) of the farmers had preference for commercial feed and benefited from its use in diverse ways due to feed availability in the district. This implies that if the challenges in terms of price instability, unavailability of other feed types and feed ingredients, the threat of some diseases and poor quality day old chicks and finance are resolved; farmers will stay in business and promote the development of the poultry industry.

Recommendations

The following recommendations based on the study could be considered.

- Since the poultry farmers preferred and benefited from commercial feed usage, it is important to financially support them and the suppliers in the form of credit through the banks, at low interest rate. This will increase the availability and use of the feeds to improve chicken productivity and production. This will enable the feed sector to keep pace with poultry production, to further sustain the development of the poultry industry and the economy at large.
- It was found essential to provide training for the poultry farmers particularly in areas of feed formulation and preparation and identification of good quality commercial feeds.
- The youth and women should be encouraged and motivated to take advantage of the readily available quality commercial feeds and to assist them to work satisfactorily and efficiently in the communities.
- Ensuring the availability of poultry inputs (feed and drugs) for the production of chicken in the districts in the country must be a priority of the District or Municipal Assemblies and MoFA.
- Manufacturers of commercial feeds must be encouraged and supported to produce quality feeds guided by suitable laws and monitored by the relevant agencies such as the Food and Drugs Board.
- Maize, soya bean and fish producers must be encouraged to form viable associations (e.g. FBOs) and enter into partnerships with feed manufacturers to boost local production of major the feed ingredients to benefit poultry farmers in the SWD, Ghana.

- MoFA and the Ministry of Education should collaborate to train more Livestock Officers or Animal Production workers to assist and further train farmers in areas of feed formulation basic feed mixing, identification and selection of feed sources and the usage of high quality commercial chicken feed.
- The Animal Production and Veterinary Services Directorates of MoFA must update their census data on poultry and livestock to facilitate planning for feed and other inputs.
- Finally, it is suggested that, livestock production policies, border alert measures and feed laws should be enacted and enforced based on the challenges and suggested solutions identified by the farmers in this study. These will guide, promote and sustain chicken production in SWD, enhance development of the poultry industry and in general, improve upon living conditions in Ghana.

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APPENDIX A:

INTERVIEW SCHEDULE FOR POULTRY FARMERS

Introduction:

This is an interview schedule for poultry farmers, on the availability of commercial poultry feeds in Sekyere West District for the purpose of undertaking a student research.

Your cooperation and compliance in answering the questions is much needed.

Your confidentiality is promised and assured. Thank you.

Instructions: Please provide answers to the following questions in the spaces provided or by ticking [√] as may be required.

Date: ……

Operational area: ……

A. Personal, socio-economic and occupational characteristic of farmers

1. Farmer's name or ID. ……

2. Farm site: Specify the town or village in the space provided. ……..

3. Sex: (i) Male [ ] (ii) Female [ ]

4. Age (specify in space provided):
   (i) 20- 30 yr …….. (ii) 31- 40 yr …… (iii) 41- 50 yr ……
   (iv) 51- 60 yr …….. (v) Above 61yr …….

5. Marital status: (i) Married [ ] (ii) Single [ ]

   (iii) Divorced [ ] (iv) Widowed [ ]

6. Religion: (i) Christian [ ] (ii) Traditional Religion [ ]
(iii) Moslem [ ] (iv) Others [ ] (specify……)

7. Level of education:
(i) Basic education [ ] (ii) Secondary [ ]
(iii) Tertiary [ ] (iv) No formal education [ ]

8. Occupation: What part does poultry keeping play in your livelihood?
(i)Primary occupation [ ] (ii) Secondary occupation [ ]

9. If you ticked 8 (ii) specify your other occupation apart from poultry keeping
(i) Teaching [ ] (ii) Clerical / Accounting [ ] (iii) Transport [ ]
(iv) Clergy / pastor [ ] (v) Crop farming (vi) Other livestock [ ]
(vii) Other (specify…….)

B. Farm Activity Records and History:

10. Specify how long you have been keeping poultry.
(i) 0 – 4 yr […] (ii) 5 – 10 yr [...] (iii) 11 – 15 yr [……]
(iv) 16 – 20 yr […….] (v) above 20 yr […….]

11. Which type of poultry enterprise do you engage in?
(i) Broilers only [ ] (ii) Layers only [ ] (iii) Cockerels [ ]
(iv) Both layers & broilers [ ] (v) Both layers & cockerels [ ]
(vi) All three: layers, broilers & Cockerels [ ].

12. What is your average bird capacity; or size of your farm? Tick the scale, and then specify the average number kept in each production cycle per year?
(i) Large scale: over 2000 birds. [ ] …… birds
(ii) Medium scale: 500 – 2000. [ ] …… birds
(iii) Small scale: 50 - 500. [ ] …… birds

13. Specify the total bird population that you kept from January to December each year for the period under consideration, if you kept birds.

	2004	2005	2006
Layers	……	……	……
Broilers	…….	……	……
Cockerels	…….	……	…….
Total	……	……..	…….

14. What encouraged or helped you to stay in the job during the last two or three years? Give reasons in order of priority (using 1st, 2nd …… etc in decreasing order of importance).

(1) Availability of commercial feeds and drugs in SWD. [ ]
(2) Good market for products and profitability in the poultry business. [ ]
(3) Availability of Day Old Chicks [ ]
(4) Financial assistance from banks [ ]
(5) Advice / support from District MoFA [ ]
(6) Other [ ] (specify……..)

15. If you are not in business currently or you ever stopped after 2004, what major problems led to your decision to leave poultry production? Give reasons in order of importance (using 1st, 2nd, 3rd ….etc in decreasing order of importance).

(1) High cost of production inputs and difficulty in obtaining good quality feed ingredients during certain periods of the year. Specify: ……. [ ]
(2) Difficulty in obtaining quality DOC at the right time. [ ]
(3) Poor market / price of products making the business unprofitable. [ ]
(4) Threat of Disease outbreaks: Bird Flu scare; [ ], others, specify: …….
(5) Financial constraints; lack of credit and huge interest on loans [ ]
(6) Other [ ] (specify……).

16. What is your major source of feed supply and the location?

(1) Within SWD - Mampong. Agricare agency [ ]

(2) Outside SWD - Jamasi. Gafco agency [ ] Agricare [ ]

(3) Outside SWD - Kumasi. Vaks, [ ] Darko [ ] Agricare [ ]

17. By what means do you convey your feeds to the farm site?

(1) Own vehicle [ ] (2) private transport [ ]

(3) Free transport [ ] (4) bicycle [ ]

18. In which period did you first identify the existence of the only commercial feed depot / outlet (Agricare) sited in Mampong – Ashanti, SWD?

(1) December, 2003 – Dec.2004 [ ] (2) January, 2005 - Dec. 2006 [ ]

(3) After Jan. 2007 [ ] (4) Not aware. [ ]

19. To what degree has availability of commercial feeds in the district helped you to reduce the cost of feed component and improve upon your production targets?

(1) Greatly improved [ ] (2) slightly improved [ ]

(3) Not improved [ ] (4) Indifferent [ ]

20. In what way have you succeeded in cutting down the cost of feed component (feed plus transport costs or interest on loans) incurred in poultry production during the past few years? Choose which way is most applicable to you by using 1^{st} , 2^{nd} … etc in decreasing order of importance.

(1) Availability of commercial feeds in the district has enabled me cut down the cost of production in terms of transportation cost. [ ]

(2) I no more depend on loans to buy large stocks of feed from far to incur high interest payments but use cash from farm sales to obtain feeds nearby.[ ]

(3) I try to obtain the required feed earlier than it is needed on the farm to avoid failure and risk of travelling long distances in search of feed. [ ]

(4) I offer my birds with correct amount of feed at the right time and avoid feed spillage or wastage by using proper containers. [ ]

(5) Other, specify ……[ ]

21. If you obtain feed from the outlet in SWD, how has the location of feed supply improved timeliness in your production since 2004? Indicate which of the following statements are applicable to you in order of priority using 1st as the highest and so on.

Answer:

(1) I get more time to attend to the birds and provide them with sufficient water, medication and feed than before. [ ]

(2) It allows me sufficient time to do other farm activities easily. [ ]

(3) I can buy and get feed to the farm anytime it is needed without starving birds by wasting much time and money travelling for feed. [ ]

(4) Feeding is now timely and not delayed due to the nearness of supply of the right type of feed for the birds. [ ]

(5) Other , specify ……. [ ].

22. If you obtain feed from outside SWD, what prompts you? Give at least 3 reasons in order of importance (using 1st, 2nd, 3rd ….etc in decreasing order of importance).

Answer:

(1) The commercial feed agency of my choice is not available in SWD.

(2) Because I can get feeds and feed ingredients on credit outside the district. [ ]

(3) The distance to the feed depot is much convenient than that within SWD. [ ]

(4) I do not obtain some feed ingredients within SWD. [ ]

(5) I have sufficient money and own transport to do bulk purchase from the main sources of supply of feeds outside the district. [ ]

(6) Other, specify ……. [ ].

23. What kind of feed formulations do you use?

(i) Commercial feeds – e.g. using concentrates, mashes or pellets [ ]

(ii) Home-mixed or Self-formulated feeds – e.g. using individual ingredients like maize, fish meal, wheat bran, soya bean etc. to formulate and mix feed on the farm. [ ]

(iii) Both [ ]

24. Which one of the two feed formulations do you prefer or recommend for wide use?

(i) Commercial feeds [ ]

(ii) Self-formulated feeds [ ]

25. Give at least 3 reasons for your choice of the above feed formulation for poultry farmers in SWD. Prioritize your answer using 1st, 2nd, 3rd …...etc. in decreasing order of relative importance.

(1) Availability of feed supply and easy to usage of feeds [ ]

(2) Reliability and constancy in feed quality and supply [ ]

(3) Affordable and safety from contamination is assured [ ]

(4) Personal preference [ ]

(5) Cheap though difficult to asses and use correctly [ ]

(6)Other, specify…… [ ]

26. Which of the following developments have you experienced in your farm operations since you started using the above commercial feed formulation of your choice? Indicate your experiences in order of priority, using 1st, 2nd, and 3rd ….etc in decreasing order of relative importance.

(1) I spend less time mixing feeds whilst using commercial feeds than with individual ingredients for self formulation. [ ]

(2) I am able to give uniform, constant and timely feed, avoiding mixing mistakes. [ ]

(3) Whilst using commercial feeds I am able to feed my birds with well balanced diet even though I am not knowledgeable in formulating my own diet. [ ]

(4) I can increase bird numbers without getting much exhausted in preparation. [ ]

(5) It has helped me to keep morbidity and mortality low, and also disease occurrences and medication to the minimum. [ ].

(6) None / Other, specify ……. [ ].

27. If positive improvement has occurred due to the quality of the feed used, show areas of improvements in order of priority (using 1st, 2nd, etc in decreasing order of priority).

(1) Improved egg size or quality [ ] (2) Improved growth rate of birds [ ]
(3) Reduced maturity time of broilers [ ] (4) Improved health status of birds [ ].
(5) Other …… [ ].

28. Have you ever been trained in how to formulate and prepare well balanced poultry diets or ration?

(1) Yes, had formal training. [ ] (2) Yes, informally trained. [ ].
(3) No. [ ].

29. If you kept poultry between 2004 and 2006, have there been any improvements or benefits in production over previous years when feeds were not available in the district?

(1) Yes [ ]
(2) No [ ]

30. If yes, state the type of benefits or improvement that you have attained in order of priority, using 1st, 2nd, 3rd ….etc in decreasing order of importance.

(i) I have increased my bird numbers or population. [ ]
(ii) I have been able to expand the size of my farm structures. [ ]
(iii) I am now self dependent; able to reinvest capital, pay off bills, fees, etc. [ ]
(iv) Bird performance is better, production targets are achieved and marketing has improved. [ ]
(v) I have time for my personal and other family needs since I now spend less time and money looking for feeds and preparing feeds for the birds. [ ]
(vi) Other [ ]; (Specify ……).

31. If no to 29, what problems hindered your progress if any? Answer using 1st, 2nd, 3rd …etc. in decreasing order of preference.

(i) Unavailability and un-affordability of some commercial feeds and some feed ingredients especially maize and fishmeal. Specify yr. …… [ ]

(ii) High cost and poor quality day old chicks [ ]

(iii) Financial constraints or family and personal problem [ ]

(iv) Poor product market opportunities [ ]

(v) Threat of Disease outbreaks: Specify: disease……

Yr. …….. [ ]

(vi) Other [ ] Specify: ……

32. What are some of the major challenges you encounter as a poultry farmer that worry you most? List up to four, in order of importance and suggest possible solutions to them.

A. Problems / Major challenges:

(1)

(2)

(3)

(4)

B. Suggested solutions

(1)

(2)

(3)

(4)

APPENDIX B:

QUESTIONNAIRE FOR POULTRY FEED SUPPLY AGENT.

INTRODUCTION:

This is a suggested Questionnaire, to be answered by AGRICARE Agent in Mampong – Ashanti to assess the availability, affordability and use of commercial poultry feeds by farmers in Sekyere West District (SWD).
This research is being conducted to obtain information to analyse for the purpose of writing a student dissertation.

Your confidentiality is promised. Your cooperation in answering the questions below is much needed and will be appreciated with thanks.

Instructions:
Please provide answers to the following questions in the spaces provided or by ticking in the box [√] or otherwise on the attached sheets as may be required.

1. Indicate in the spaces provided when the agency started operating in the district! [Month…… / Yr…….]
2. Which of these commercial feeds did you supply to your clients?
   (a) Mashes and Concentrates [ ] (b) Concentrates and Pellets [ ].
3. What commercial feeds do you sell currently, in 2007?
   (a) Mashes / Concentrates [ ] (b) Concentrates and Pellet feed [ ].
4. Which of these feed ingredients do you sell to your clients?
   (a) Oyster shells, Wheat bran, Fish meal, Soya bean and Maize [ ]
   (b) Oyster shells, Wheat bran, Fish meal. [ ]
   (c) Other [ ]
   (specify……..).

4. Do you supply different types of concentrates and mashes / pellets to different categories of poultry (chicken)? (1) Yes [ ] (2) No [ ] Name them. …….
5. What quantity of feeds (concentrates and mashes) is made available at the outlet for farmers monthly? Give minimum and maximum range.

6. What measures have you put in place to maintain quality of the products for farmers? Indicate at least 3 most important measures.

   ……

   ……

   ……

   ……

7. What measures have your outfit instituted to ensure availability or regularity of supply? Mention at least 2.

   ……

   ……

   ……

   ……

8. What measures have you put in place to ensure that products are affordable and are patronized by clients? Mention at least 2.

   ……

   ……

   ……

   ……

9. What problems or challenges do you encounter as a feed agent? List five, with suggested possible solutions, in order of priority.

(a) Problems / Challenges:

(1)

(2)

(b) Suggested possible solutions:

(1)

(2)

10. Please complete the list of prices of the commercial feeds sold to farmers from 2004 to 2006 as detailed on Table 1 overleaf.

10. Please provide data on the farmers who purchased feeds from the agency and the quantity of commercial feeds sold to them every month from 2004 to 2006 for entry as detailed on the attached Tables 2 – 4 (Jan. – Dec.).

Table 1: List of the range of Prices of Commercial feeds sold to Poultry farmers in Sekyere West District (SWD) from 2004 to 2006.

Year/ Month	Concentrates				Mashes			Remarks
	Broiler	Chick	Grower	Layer	Broiler	Chick	Grower	
2004 Jan.- Dec.								
2005 Jan. Dec.								
2006 Jan. - Dec.								

Table 1 (Jan. – Dec.): 2004 Annual / Monthly data on Commercial feeds sold and farmers purchasing them.

Year/ Month	Feed type	Quantity of feed sold per month tallied in no. of bags. (50kg / bag)	Total no. of bags. (50kg / bag)	Names of individual farmers who purchased feed / month	Total number of individual farmers / mth.
2004 Jan.	Concentrates Broiler				
	Chick				
	Grower				
	Layer				
	Total				
	Mashes Broiler				
	Chick				
	Grower				
	Total				

Table 2 (Jan. – Dec.): 2005 Annual / Monthly data on Commercial feeds sold and farmers purchasing them.

Year/ Month	Feed type	Quantity of feed sold per month tallied in no. of bags. (50kg / bag)	Total no. of bags. (50kg / bag)	Names of individual farmers who purchased feed / month	Total number of individual farmers / mth.
2005 Jan.	Concentrates Broiler				
	Chick				
	Grower				
	Layer				
	Total				
	Mashes Broiler				
	Chick				
	Grower				
	Total				

Table 3 (Jan. – Dec.): 2006 Annual / Monthly data on Commercial feeds sold and farmers purchasing them.

Year/ Month	Feed type	Quantity of feed sold per month tallied in no. of bags. (50kg / bag)	Total no. of bags. (50kg / bag)	Names (ID) of individual farmers who purchased feed / month	Total number of individual farmers /month.
2006 Jan.	Concentrates Broiler				
	Chick				
	Grower				
	Layer				
	Total				
	Mashes Broiler				
	Chick				
	Grower				
	Total				

Appendix C

Quantities of commercial feeds (concentrate and mash) used in SWD

Table 1: Monthly and annual concentrate and mash use in Sekyere West District (SWD), 2004 – 2006

	Concentrate use			Mash use		
Year / Month	2004	2005	2006	2004	2005	2006
	Total quantities in 50kg bags			Quantities in 50kg bags		
Jan	59	77	74	13	6	18
Feb	35	55	41	10	7	7
Mar	33	63	62	14	15	5
Apr	41	54	34	10	12	1
May	20	51	52	4	7	8
Jun	31	49	36	10	10	5
Jul	40	62	27	23	14	3
Aug	77	71	35	23	7	9
Sep	76	46	39	47	11	6
Oct	108	52	54	51	11	25
Nov	130	64	82	20	12	6
Dec	118	81	57	30	11	5
Total	768	725	593	255	123	98
Average	64	60.42	49.42	21.25	10.25	8.17
Max	130	81	82	51	15	25
Min	20	46	27	4	6	1

Source: Field, 2007

Table 2: Monthly and annual concentrate and mash users in Sekyere West District (SWD), 2004 – 2006.

	Concentrate users (farmers)			Mash users (farmers)		
Yr. /	2004	2005	2006	2004	2005	2006
Month	Total number of farmers			Total number of farmers		
Jan	30	44	23	8	4	10
Feb	29	28	23	10	5	5
Mar	24	29	31	12	9	5
Apr	36	25	25	9	9	1
May	20	20	23	4	4	8
Jun	24	23	16	9	6	4
Jul	28	23	11	16	7	2
Aug	38	22	15	18	3	5
Sep	39	18	20	14	8	4
Oct	54	20	27	34	6	14
Nov	68	28	28	15	7	6
Dec	80	38	31	22	7	5
Total	470	318	273	171	75	69
Average	39.16	26.50	22.75	14.25	6.25	5.75
Max	80	44	31	34	9	14
Min	20	18	11	4	3	1

Source: Field, 2007

Appendix D

Census of chicken farmers in SWD

The preliminary survey and census of chicken farmers undertaken in June, 2006, revealed that; the population of chicken farmers stood at 95 in 2004, declined to 65 in 2005 and increased to 75 by June, 2006.

Census of chicken in SWD

Annual Chicken populations were 122,059birds for 2004; 94,157 birds for 2005 and 124,682 birds for 2006 by census count and interviews.

By April, 2007, 62 poultry farmers were identified as active.

For the farmers studied in 2007, who used Agricare feeds, Annual total chicken enterprise populations increased from: 77,210 birds; to 86,770 birds; to 100,360 birds; for 2004, 2005 and 2006 respectively.

Source: Field census (2006 / 7).