International Journal of Research in Agricultural Sciences
Volume 1, Issue 5, ISSN (Online): 2348 – 3997)

Menace of Newcastle Disease to Sustainable Guinea Fowl Production in Saboba District: Social and Economic Implications

Abdulai Abubakari

Abstract – **This paper shares light on guinea fowl production as means of youth employment and the challenges posed by Newcastle disease in Saboba District of Northern Ghana. The paper is situated in the context of Savannah Accelerated Development Authority (SADA) backed by Act 805 that provided special attention to less developed parts of the country by providing opportunities for the people to engage in sustainable income generation activities. Using data and information gathered through interviews with guinea fowl farmers, government officials and an analysis of secondary data, the paper found among other things that, guinea fowl rearing has the potential for poverty reduction, food security, employment and revenue to the state. However, these gains are threatened by high mortality rate and poor vet services. The paper demonstrates that high mortality rate has negative social and economic implications such as food insecurity, lost of labour, domestic instabilities among other. It further notes state assistance to farmers is virtually non-existence. It recommends among others that Ministry of Food and Agriculture in collaboration with the District Assembly should take measures to control the Newcastle disease by providing education and vet services to farmers.**

Keywords – **Farmers, Guinea Fowls, Newcastle Disease, Treatment, Veterinary Services.**

I. BACKGROUND

Domestic Guinea Fowl (*Numida meleagris*) are common type of poultry reared under the extensive system in the Northern Ghana. Guinea fowls have a lot of economic and social benefits. They provide a major source of protein, provide employment for the people, generate regular income and are used for religious, social and marital rites in Northern Ghana. They are exclusively used for the Guinea Fowl Festival celebrated annually by the Dagomba, Mamprusi and Gonjas. Guinea fowls are also used for scarifies. In Northern Region they are also the preferred poultry to be used to welcome very important guests/strangers such as in-laws, chiefs, etc.

Guinea fowls can grow in large numbers if given proper care. The eggs are also very delicious and can be found throughout the year. The thicker shells make them durable and handling with minimal damage. The mature guinea fowls are also smart and stronger and can defend themselves against other poultry. They can be reared under extensive, semi-intensive or intensive systems. They can also be hatched in large numbers. Traditionally, chicken, ducks and turkeys can be used to incubate guinea fowl eggs and hatch large numbers of them. The easiest way is to use a broody bird to lie on the eggs as it will keep the chicks warm, teach them how to scratch for food and warn them of any danger. Otherwise if an incubator is used the humidity should be kept low, as a change of weather and high humidity can destroy a whole batch of eggs [1].

Knoey [2] notes that there is no need keeping a lot of cocks in the flock once birds are well grown. One cock is enough to serve a flock of hens. They are quite tamed but occasionally will fly up trees or roofs when disturbed. One can leave them overnight as they are quite safe off the ground [2].

As a result of their unique qualities, traditionally guinea fowls are reared in larger numbers than any other domestic poultry in the northern Ghana. Secondly, because they are mostly reared under the extensive system, it is more easy, cost effective and cheaper to rear them. Guinea fowls are cheaper to keep as they eat a lot of grasses and other greenery particularly when kept outdoors. They also eat layers pellets used to feed hens which can be mixed with corn for a special treat. Young chicks which are called keets are fed on chick crumbs for the first six weeks, and then growers pellets from 6-20 weeks. With little care and feeding, guinea flows can lay eggs daily for over six months in a year. One guinea fowl will lay 70-100 eggs per year [2]. They are not fussy about where they lay their eggs and it can be in the open ground or in the bush.

Though the Savannah Accelerated Development Authority Programme [3] acknowledges the high mortality of chicks and highly fragmented market outlets as some of the key constraints in the guinea fowl value chain, the government of Ghana has identified rearing of guinea fowls as part of the measures of modernizing agriculture, diversify farm income sources and providing income opportunities for land scarce parts of northern Ghana [3].

Since SADA has been mandated by Act 805 of 2010 to coordinate a comprehensive development agenda for the Northern Savannah Ecological Zone (NSEZ) in Ghana, little empirical studies have been conducted by academics, especially, sociologists and anthropologies to analyse the social and economic impact of the agency on the livelihoods of the people. This paper seeks to examine the menace posed by Newcastle disease to sustainable guinea fowl production in Saboba District of Northern Region of Ghana. Specifically, it analyses the farmers' perception about the potential of guinea fowl rearing to poverty to reduction, improvement of livelihoods, ensuring food security and generating revenue to the District Assembly. It also examines how farmers manage and market the guinea fowls. It then examines the menace of the Newcastle disease and the measures farmers adopted to treat their flock. Finally, it examines the implication of the disease to the poor farmers.

II. The Context

The Savannah Accelerated Development Authority (SADA) is an independent agency mandated by the SADA Act of 2010, Act 805 to coordinate a comprehensive development agenda for the Northern Savannah Ecological Zone (NSEZ) in Ghana – comprising the three northern regions of Ghana, and parts of districts located in the north of the Brong Ahafo and Volta regions. This was a fall out from the widely acknowledged fact that the three Northern Regions of Ghana are lagging behind the rest of the country resulting from several factors including deliberate colonial policies [4], [5], [6], [3] natural and manmade disasters such as conflicts, droughts, floods, poor agricultural outcome among others [7].

Consequently, SADA seeks to develop and provide opportunities for poor peasants, especially women, to own assets in economic trees, sustain their food crop production and protect the fragile eco-system of the northern savannah by managing the flood-prone river-beds better. The SADA strategy stresses strong guinea fowl productions as a means of poverty reduction and creation of jobs and wealth for the rural poor. Guinea fowl was found to be a delicacy of Ghanaians and can be reared in commercial quantities as an alternative livelihood activity to diversify farmers' incomes [3].

On 28th November, 2012, SADA went into joint partnership with a private company called SADA Asongtaba Guinea Fowl Production & Marketing Company Limited. Almost immediately, the company was incorporated on 4th December, 2012 and commenced business on 5th December, 2012 [8].

The aim of the venture was to produce "guinea fowls using the out grower system to provide jobs for at least One Thousand and Five Hundred (1,500) youth and women out-growers who will be developed and equipped to produce over Two Hundred and Fifty Thousand (250,000) guinea-fowl birds annually over a five year period" [8]. As a result, many rural farmers were convinced to go into guinea fowl rearing oblivious of the devastating menace of Newcastle Disease.

The Study area

The Saboba District is one of the 26 districts in the Northern Region. The district was carved out of the then East Dagomba District (Now Yendi Municipal) in 1988, in pursuance of the Government's Decentralisation and Local Government Reform policy, with Saboba as the district capital. The district lies between Latitudes 24^o N and 25^o N; Longitudes 27^o E and 13 ^{o} E and covering a land area of approximately 1,100km^2. It shares boundaries with Cheriponi District to the north, Gushiegu and Karaga districts to the west, Yendi to the south-west; Zabzugu/Tatale to the south and on the east, is the River Oti, which serves as the international boundary between Ghana and the Republic of Togo [9].

The district has a total population of 65,706 persons made of 32,320 male and 33,386 female [10]. The Konkomba are the majority ethnic group in the district though there are other ethnic groups such Chakosi, Mossi, the Basari, and the Ewe.

Agricultural Sector

The district's economy is purely rural and dominated by subsistence agriculture. The main crops cultivated include millet, sorghum, beans, maize, rice and groundnuts. Other food crops cultivated in the area include cassava, yam and vegetables (okro, tomatoes and pepper). Other economic activities of any importance are agro-based small-scale industries and income generating activities. The main cash crops grown are cotton, soya-bean, tomatoes and some cashew plants [9].

Livestock and poultry

Livestock, especially small ruminants and poultry are kept by almost every household. Thus, it is a common feature for every farmer to keep at least small ruminants and poultry and more importantly pigs as they used for performing funerals. Cattle are also reared by well to do families. Most of the times, cattle are entrusted to the care of pastoral Fulani herdsmen.

Commerce

As the district is predominantly rural, most of the commercial in and around the district capital are mainly farm produce and agro-chemical commodities. Petty trading, especially on industrial goods for domestic consumption is common in the towns. Most of the business women are engaged in food processing especially in groundnut, rice, shea butter and soyabean. Others are into sewing and dress making, food stuff trading, brewing among others. Commercial activities are more pronounced on market days when people deal in various merchandise goods with traders coming in from other adjoining Districts and Togo. Some of the main market centers are in Saboba, Gbangbanpon, Kpalba, Sambuli and Wapuli. There is also high cross border trading activities with the people in Togo, partly due to poor border control and as the people across the border share the same ancestral and cultural heritage. Hence trading activities are common, especially, with the markets in Togo such as Kpetabu, Kuuka, Porsaak, etc, [9].

Government Policies on Guinea Fowls

The objective of this section is to review or provide detailed information on the production systems of guinea fowls in Ghana, the marketing system and the role of guinea fowls and poultry in rural livelihoods and food security. This review will also provide detailed analysis on the effects of Government policy and economic factors on the decline of the poultry sector.

The Government of Ghana in the 1960's identified poultry production as the greatest potential or addressing the acute shortfall in the supply of animal protein and job creation, and established an integrated poultry project in Accra. The growth of the industry was slow initially, as supplies of day-old chicks and other inputs were irregular. This was exacerbated by frequent outbreaks of Newcastle Disease which discouraged potential farmers. These constraints were overcome, and by the 1970s poultry production, supported by removal of custom duties on poultry inputs (feed additives, drugs and vaccines) and improved veterinary services, poultry production was undertaken by many farmers either full-time or on part-

time basis, especially in the urban areas of Accra and Kumasi [11].

In the early 1980s however, the downturn in the Ghanaian economy severely affected the availability of feed ingredients and other inputs and poultry production declined. Although the situation improved somehow towards the end of that decade a change in Government policy resulting in trade liberalization (and the influx of cheaper poultry meat products) and the re-imposition of taxes and duties on imported inputs for the poultry industry have since then caused a severe decline of the poultry industry in Ghana [11].

Realizing the important role that guinea fowl can play in economic development, in generating employment, income and alleviating poverty, the government of Ghana over the years consider guinea fowl production are tool in providing employment, and alleviation poverty. During the Kuffour's administration (2000 to 2009) guinea fowl production was one of the key policies frequently mentioned in the numerous president special initiatives, though it was not given the desired attention. In 2010, the Attah Mill's government added guinea fowl production into the National Youth Employment Programme. Guinea fowl production has also been mentioned in the Savanna Accelerated Development Authority (SADA) as a cogent agricultural and youth employment policy that is capable of providing employment and helping bridge the north-south divide of Ghana.

III. Methodology

The study was conducted in Saboba in the Northern region of Ghana. It employed a mixed approach combining both quantitative and qualitative data and was carried out in three phases between February and August 2014. Each of the phases lasted between 5 and 10 days. The first phase was in February 2014 where researcher interacted with the leadership of Kakpeni Cooperative Guinea Fowl Farmers Society. Officials of the District Assembly and MoFA were identified and some preliminary interviews were conducted. The second phase was in April where more interviews and two focus group discussions were conducted. The last phase was in August 2014. This phase was the consolidation phase where further interviews were held and clarifications were made.

The Kakpeni Cooperative Guinea Fowl Farmers Society which has 20 groups across the district with a total membership of 274. Each group has a minimum of 15 and maximum of 20 farmers. A list of all the groups was obtained from cooperative where between 8 and 10 members were randomly selected from each group. In all, 173 farmers were selected. In addition to this 10 officials from MoFA and the Saboba District Assembly were purposively selected for the study. These officers included; the District Finance Officer, the District Planning Officer, the District Agriculture Officer, the District Engineer, the Veterinary Technical Officer, the District Development Officer, the District Director of Agriculture, the District Coordinating Director, and two agriculture extension officers.

A. Data collections were interviews, using semi-structured interview guides. Semi-structured questionnaires were also use to obtain information from the respondents; guinea fowl producers and Ministry of Food and Agriculture and staff of the Saboba District Assembly. Guinea fowls producers were also interviewed individually and in groups. Three focus discussions were also held with some guinea fowl farmers at separate locations. Finally, the researcher visited 8 guinea fowl farms and interacted with farmers and made direct observations. The visits were made at different times

IV. Results and Discussion of Findings

Guinea Fowl Rearing in Saboba: Kakpeni Cooperative Guinea Fowl Farmers Society

Kakpeni Cooperative Guinea Fowl Farmers Society is probably one of the most important guinea fowl (*kpan*) farmers in Saboba District. It comprises of 15 subgroups and each sub group has an average membership of about 15 to 20 people. Thus, the total membership of the all the groups combined stood at 274 persons. Out of this figure, 58 or 21% were women. These groups have specialised in the rearing of guinea fowls and have comparative advantage and skills in producing these birds. About 30% of the society's members reared guinea fowls as their second major occupation after farming. At the time of doing the study, the number of fowls individual had ranged between a minimum of 20 to a maximum of 200. However, the average number of fowls was 26 per person. In addition to rearing guinea fowls, almost all of them indicated that they keep other type of poultry such as chicken, ducks and turkeys.

V. Respondents Perceptions about the Potentials of Guinea Fowl Rearing

Guinea fowl farmers and official of the District Assembly and of Ministry of Agriculture were of the view that the birds have great potentials as outline on Table 1.

Table 1 : Respondents Views about Guinea Fowl rearing potentials

Respondent's perception	Freq.	%	Total respondents
Provide ready income to the farmer	183	100%	183
Improved livelihood	174	95.1	183
Poverty reduction	126	68.8	183
Reduced food insecurity	102	55.7	183
Generate revenue to the DA	95	51.9	183
Contribute to economic development	59	32.2	183
Improve nutritional status of the people	37	20.1	183

Source: Field survey, 2014.

From Table 1, it is apparently clear that, respondents were unanimous that guinea fowl rearing has a great potential for providing regular and ready income. They argued that the eggs are high demand and mature guinea fowls can lay eggs for between 6 to 8 months in a year. The farmers can also sell them at anytime. The majority (95.1%) also mentioned that guinea fowl production can also contribute to the improvement of livelihood. Almost invariably, the majority (more than 50%) indicated that it has the potential of reducing poverty, improving livelihood, ensuring food security among others. For those who indicated that it generates revenue to the District Assembly through tax were 51.9%. However, most of them sell their guinea fowls in pieces (one, toe or three at a time) thus avoiding taxes. Only 20.1% were of the view that guinea fowl production can contribute to improvement of their nutritional status, because the majority of the farmers produce and sell rather than consuming it directly.

It is not surprising that the government considered it as part of the National Youth Employment Programme. It is also not surprising that guinea fowl production is part of the Savanna Accelerated Development Authority (SADA), a Government of Ghana policy that aims at bridging the development gap between the north and south of Ghana.

Guinea Fowl Management and Breeding

About 82% of the guinea fowl farmers in Kakpeni Cooperative Guinea Fowl Farmers Society kept their flock under the semi-extensive system where the birds are partly allowed to roam about and search for food in addition to being fed by their owners. The farmers indicated that most guinea fowls started laying between 7 to 9 months. However, the veterinary officers indicated that under improved conditions some guinea fowl can lay earlier than this They however, mentioned that active eggs laying often begins in March at the onset of the rainy season and October when the rains subside. Nevertheless, old guinea hens began laying earlier in January or February. According to the respondents, egg-laying patterns of the guinea fowls are characterized by a peak of egg-laying often in July (79%), followed by June (20%) and a minimum in September (12%). "It is rare for them to lay eggs between October and December, i.e., during the dry season" remarked by participants at focus group discussion.

The study also revealed that local hens were used to incubate guinea fowl eggs and were preferred to guinea fowl hens. The reasons for such choices by the farmers were that the hens hatch and brood better than guinea fowl themselves.

They claimed that egg hatchability and keet survival were significantly higher with local hens than with guinea fowl themselves. The farmers (64%) reported that the incubated eggs came from their own farms, 20% purchased from other breeders, while 16% either buy from the market or from breeders. They try to avoid using eggs from the open market, because "they are usually not very good because storage conditions can reduce egg fertility" indicated by focus group discussion participants. They further mentioned that each hen can incubate an average of 22 eggs. The average incubation time was estimated to be around 28 days [12].

Guinea fowl growth and performance in Saboba

The majority (68%) of the farmers in the Kakpeni Cooperative Guinea Fowl Farmers Society indicated that guinea fowls are slow in growth rate when compared to chickens. A guinea fowl can grow up to a mean body weight of 1228g at 7 months of age [12]. Farmers frequently reported that, in the free-range systems, keets raised during the rainy season showed higher growth rate and body weights compared to those raised in confinement during the same period. This is because they eat variety of food including insects, grasses and scavenge for different kinds of food. Thus, they refer keeping the guinea fowls under the semi-intensive system to intensive system.

Marketing

There is a ready market for guinea fowl and guinea fowl eggs and most farmers can decide to sell their guinea fowls in any way they like. For instance, a farmer can decide to sell 1, 2, 3. .. or any number his/her likes. Cook food sellers popularly call 'Chop-bars' and drinking spots are often the buyers. However, the Saboba market, Gbangbanpon, Kpalba, Sambuli and Wapuli Yendi, Tamale, the local chop-bars, restaurants, beer bars, etc are all places where guinea fowls could be sold. A farmer could sell a mature guinea fowl between Ghana cedis 15 to 20 (USD 4 to 5.5). At the restaurants and drinking bars, a roasted guinea fowl can be sold between 18 to 20 Ghana cedis.

Producers (Farmer –Traders)

Only a small number (10%) of the farmers sell at farmgate. They also sell whole dressed broilers to families and caterers. The latter tend to dictate the price as they have alternative (import) sources. Guinea fowls are sold live either at farmgate or on the market. Less than 10% indicated that they process for sale as whole birds.

Retailers

Traders go to the Kakpeni Cooperative Guinea Fowl Farmers Society farms to purchase birds in bulk for further retailing. They usually sell these birds live in the open market. There is some vertical integration, with some producers selling live at farmgate and processing for retail (through their own outlets, such as their own farms or other farms. Farmers frequently mentioned that some retailers, especially women who buy frozen guinea fowls from wholesalers retail them sometimes at the premises of the cold stores. Others retail in the local market, where they may have smaller refrigeration.

VI. The Menace of the Newcastle Disease

All farmers in Kakpeni Cooperative Guinea Fowl Farmers Society reported that losses often occurred in their flock, especially the keet due to Newcastle diseases, which is considered as a major constrain to guinea fowl production. Though predators such as snakes, hawks, shrews, dogs, pigs, ducks, cats and lizards, etc also kill the flock, the Newcastle disease causes the most devastating destruction to the guinea fowls than any other thing.

The survey reported that the Newcastle disease is more serious and devastating for keets than adult guinea fowls [13]. The farmers indicated that, an outbreak of Newcastle disease can claim the life of over 50% flock, and in worse situations, 100% losses can be recorded. All (100%) of the respondents mentioned the diseases as the single most important problem that militates against sustainable guinea fowl rearing in the area.

The farmers frequently mentioned that keet mortality constituted the major problem and sometimes discouraged farmers. Eighty-nine percent (89%) of the interviewees reported that important losses often occur in the first month of hatching. They also attributed keet mortality to exposure to bad weather such as rains, cold or heavy dew, and parasites. Keets weakness just after hatching was also reported by farmers as a problem. Also, 34% of them indicated this as a serious problem causing mortality. While 14% thought that, this was only a small problem contributing to mortality. Keets mortality from 0 to 4 months was estimated at 3% to 100%, with an average of 68±45%.

Incidence of Newcastle Disease

Figure 1 shows the periods, month in which the cases of the Newcastle disease is devastating in the study area.

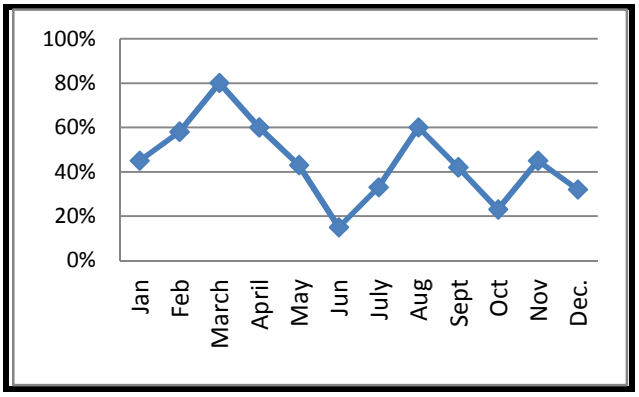

Fig.1. Trends of Newcastle Disease Outbreak in Saboba
Source: Field survey, 2014.

From Figure 1, it is clear that cases of losses of guinea fowls through the Newcastle diseases occurs throughout the year but is higher in March (about 80%), follow by August (60%) and lower in June (about 15%) losses.

Veterinary Services

The use of veterinary services is very poor among the guinea fowl farmers in Saboba. The study revealed that, despite the high number of deaths recoded by all the farmers only 25% indicated that the sought veterinary services. The remaining 75% said they did not seek veterinary services. The reasons they gave included lack of information about veterinary services, high cost of treatment, unavailability of veterinary services and ignorance.

With regards to the availability of veterinary services 55% said it is very difficult to get veterinary services, 17.5% said it is veterinary services are unavailable while 27.5% said it is easy to get. For those who said it is very difficult to get veterinary services, interviews with Ministry of Food and Agriculture officials mentioned that the veterinary doctor animal/poultry ratio in the district was about 1:5000. For this reason, farmers in the rural areas do not have access to veterinary doctors. Consequently 45% of the respondents said they treat the fowls themselves. They however, added that their knowledge is very poor.

Negative effects of the Newcastle Disease

The respondents revealed that the Newcastle disease has negative effects on the farmers output. They all mentioned that they spent large sums of money in trying to treat the birds. Aside from this, the farmers all mentioned that they loss between 40% and 60% of their flock to the diseases annually. As a result 84% of them said their income and livelihoods have been seriously affected.

All the respondents also indicated that the disease has also affected the revenue to the Assembly. The amount of taxes that they should have paid to the Assembly if their fowls were many would have been higher that when they are few.

VII. Measures Taken by Individual Farmers to Control the Newcastle Diseases

The study found that farmers used four different measures to treat their birds anytime the Newcastle disease outbreaks. These include; self medication, use of local herbs, use of veterinary doctors and others do not take any measure. The details are shown in figure 2.

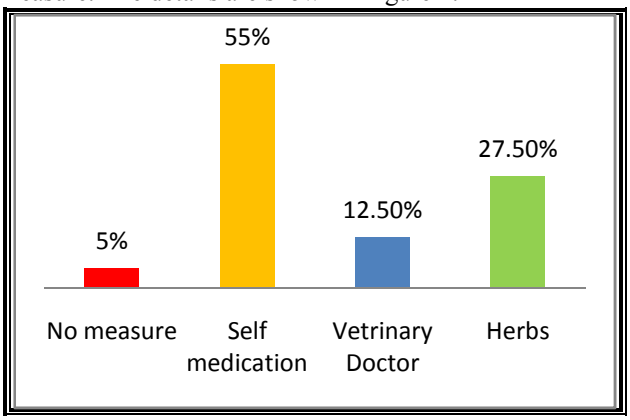

Fig.1. Individual Measures to control the Newcastle Disease in Saboba
Source: Field Survey, 2014

From Figure 2, it is clear that 55% of the respondents use self medication, 27.5% use local herbs, 12.5% uses veterinary doctors, while 5% do not attempt any treatment. For those who use self medication, they mentioned drugs such as; amoxicillin, penicillin tablets, 'Dr. Sharp' and paracetamol, etc. For those who said they used herbs, they mentioned things like the back of mahogany tree, dawadawa tree, pepper, 'bunanyinbu' 'budub' , 'banbub, etc.

The farmers (46%) frequently mentioned that they are forced to use the herbs because they do not have access to effective drug. Though the majority (54%) of them indicated that the measures they took were not effective.

Those who used self medication said it was not effective, they took those desperate measures because they could not sit down and watch their flock dye off.

Assistance given by MoFA to curb Newcastle disease

Ministry of Food and Agriculture plays very little role in trying to support guinea fowl farmers in the Saboba District. The survey indicates that only 25% of the farmers mentioned that they get treatment from MoFA. 12.5% also indicated that they get technical advice from MoFA. Collectively, only 37.5% had any form of assistance from MoFA while 62.5% indicated that they did not get any assistance from MoFA.

When asked whether they sought assistance from MoFA the last time the disease broke out, 75% said no, while 25% said yes. The majority (67%) of the respondents also does not have confidence in MoFA and thinks it is not capable of assisting farmers. 74% said they never reported to MoFA because they knew MoFA could not offer any meaningful assistance. They claimed MoFA is under staffed and constrained by personnel and logistics.

Social and Economic Implications

Newcastle diseases have a number of social and economic implications for the farmers and the District Assembly as well. Loss of flock often has direct and ramifying negative effects on the farmers and their families. Apart from causing labour lost to the farmer, it also discourages farmers from investing in guinea fowl production. Loss of flock means loss of income. This brings about food insecurity, inability to pay school and medical fees, loss of respect because of inability to meet to family and societal needs such as attending naming ceremonies, weddings, and funerals. Psychologically, farmers' hopes are dashed and compound their problems.

For those who borrowed money to invest in guinea fowl production, the loss of the flock aggravates their indebtedness. The District Assembly also looses revenue and all those in the value chain of guinea fowl production suffer negatively. It also leads to high importation of foreign poultry products to supplement.

It compounds rural urban migration as respondents indicated that some youth who suffer heavy losses had to abandon their communities for the cities. Finally, it an affront to government's policy on guinea fowl production and compounds youth unemployment situation.

VIII. Conclusions and Recommendations

Guinea fowls production can be an important venture for farmers and the nation a as a whole if attention is given to it production. Given the necessary attention, guinea fowls can be reared in large quantity large like any other poultry. The meat of guinea fowl is preferred by many people to the imported chicken. Guinea fowls are also used for social, religious, and ritual purposes and are always on high demand. It contributions to food security, income generation and revenue to the District Assembly and the GDP in general.

Farmers managed their flocks variously, but the semi-intensive systems proved to be the best as it provides guinea fowls with the opportunity to feed from variety of food. Flock mortality due to Newcastle disease could be devastating and could lead to total annihilation of an entire flock. However, government support to the farmers is lacking, despite having proclaimed the production of guinea fowls as an effective model for poverty reduction and youth employment. This let the farmers with no option but to rely on their local means and knowledge to manage their flock.

Veterinary services are poor in the Saboba District as about 75% do not seek their services, due partly to their unavailability and high cost of vet services. Thus most farmers resort to self medication, the use of herbs, etc to treat the guinea fowls.

In view of the importance of guinea fowl production as a business venture, many people should be encouraged to rear guinea fowls. Especially, more women should be assisted to rear them.

The Ministry of Food and Agriculture in collaboration with the District Assembly should take proactive measures to control the Newcastle disease as it proves to be a bane on guinea fowl production. Farmers must be educated as to how to handle the birds to avoid recording high lost. Drugs should be made available and affordable to enable the farmers use them.

Guinea fowl farmers should be educated to start the keet in June as mortality rate among them is very low compare to March.

Veterinary services should be used rather than self medication and herbs as these proved not to be effective.

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AUTHOR'S PROFILE

Dr. Abdulai Abubakari
is a Research fellow at the Institute for Continuing Education and Interdisciplinary Research, University for Development Studies (UDS) Tamale, Ghana.