

**CHARACTERIZATION OF THE POULTRY PRODUCTION SYSTEM AMONG THE
SMALLHOLDER FARMERS IN PADER DISTRICT**

A CASE STUDY OF PAJULE SUBCOUNTY



**A POSTGRADUATE DISSERTATION PRESENTED TO THE FACULTY OF
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AWARD OF THE DEGREE OF MASTER SCIENCE IN AGROECOLOGY OF
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DEDICATION

I dedicate this academic work to my family members who through the first two years of the course had to miss my presence during weekends, yet I was also absent from home during the week working away in Pader District.

My special dedication goes to Mr Akaa Dennis my husband and Mr Lakwonyero Alex my father who patiently supported and guided me to the completion of the course when I almost considered dropping out.

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LIST OF ABBREVIATIONS

A.O.	Agricultural Officer
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
IDP's	Internally Displaced People Camps
NAADS	National Agricultural Advisory Services
NGO	Non-Government Organization
NCD	New Castle Disease
NCL	National Census on Livestock
NCAL	National Census of Agriculture and Livestock
NWEP	National Women Entrepreneurship Program
UBOS	Uganda Bureau of Statistics
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
M & E	Monitoring and Evaluation
LIRI	Livestock Research Institute
LRA	Lord's Resistance Army
DDP	District Development Plan
DVO	District Veterinary Officer
DLG	District Local Government
PTA	Parents Teachers Association
YLP	Youth Livelihood Program
OWC	Operation Wealth Creation

ABSTRACT

The study set to characterize the poultry production system among smallholder farmers in Pader with focus on the management practices employed by farmers, social economic contributions enjoyed, major challenges faced and impacts of management practices on poultry production. This is because 50.1% of smallholder households in Uganda are involved in poultry keeping and 66.2% households in Pader (National Livestock Census report 2008).

The study used a case study design, using questionnaires to collect both qualitative and quantitative data from 397 households which was analyzed using excel and SPSS.

The findings indicated that the majority (97%) households kept indigenous chicken (p-value 0.000) under free range with 98.4% and (p-value 0.000). The average number of birds per household was 24.

Common management practice were feed supplementation at 65% and (p-value 0.003) using home saved grains and kitchen leftovers, few households had shelter for birds, few households paid attention to birds' health in terms of vaccination and treatment including deworming at 95%.

NCD was the major disease affecting birds. Men wielded decisions on use of poultry proceeds with 85.7% and (p-value 0.000) while women and children took care of the birds. The common problems affecting smallholder poultry farmers were; predation and limited access to Veterinary services on poultry management.

In conclusion, the smallholder poultry production system in Pader basing on the above findings is characterized by indigenous chicken on free range system under the care of women and children, regular feed supplementation with limited poultry shelter and less care for poultry health due to limited access to veterinary extension services.

The researcher hereby recommends that:

Farmers should consider provision of housing /shelter for their birds to reduce chances of predation and losses associated with adverse weather and vulnerability of chicks and brooding mother hens.

There is need to rally private veterinary service providers to rollout affordable services.

Since women were found to lead in poultry care role, development actors and policy makers should factor women's empowerment through poultry related projects.

CHAPTER ONE

INTRODUCTION

1.0 General Introduction

Having realized that poultry production in the study area plays critical role in livelihood of farmers in meeting domestic, social cultural, and overall economic developmental needs of the community, the study was conceptualized with the overall objective of searching out to document current management practices of poultry farmers, while identifying constraints faced by poultry farmers with a view that when such constraints are addressed then any improvements in practice will be able to improve rural poultry farmers welfare and contribute to development of society living in the rural setting.

This chapter provides the background and settings for the research presented in eight sub headings as below:

1.1 Background of the study

Poultry production plays an important role in the economy and livelihoods of many people globally. Annually more than 50 billion chicken worldwide are raised for meat and eggs (Ref....). According to FAO (2009), 60% – 80% of rural households in developing countries rear poultry under scavenging and free-range systems. These systems are also referred to as village poultry although widespread in urban areas too. In the African context, Kitalyi A.J. (1998) says that in nearly all African countries, poultry production in the rural areas is predominantly based on free range system utilizing indigenous type of domestic fowl. Uganda has a big resource of poultry including chicken, turkeys, ducks, geese and other birds (Sentumbwe J, 2006). Findings from the National Livestock Census (NCL) 2008 show that about half (50.1%) of the households in Uganda owned poultry of which 99.2% were indigenous breeds. The indigenous chicken constituted 87.7% of the overall chicken stock. Only 4.3% households owned ducks, 0.5% owned guinea fowls, 0.1% owned geese, and 1.3% owned turkeys. In Northern Uganda 99.8% of households reared indigenous chicken. In Pader, 22,970 households owned chicken of which close to 100% were indigenous breeds, 9.4% households owned ducks, 0.3% households owned turkeys, 0.1% households owned guinea fowls and no household owned geese.

There are many poultry production systems globally, with varying degrees of intensification. The system practiced is influenced by many factors including the financial status of the farmers, education level and the nature of the production system. These systems range from the free range, fold unit, battery cage and deep liter systems. The system practiced has a big influence on the level of production of the birds, the type of birds kept and the disease status of flocks. In most developed countries, these factors of production have been documented making it able to predict the performance of the sector. In Uganda, there is limited data on characterization of some poultry production systems making predictive modeling of the performance of this sector difficult or unreliable. The present study therefore aimed at characterizing the poultry production system in Pader, with the aim of generating data that can be used in making reliable decisions in the poultry sector in this region.

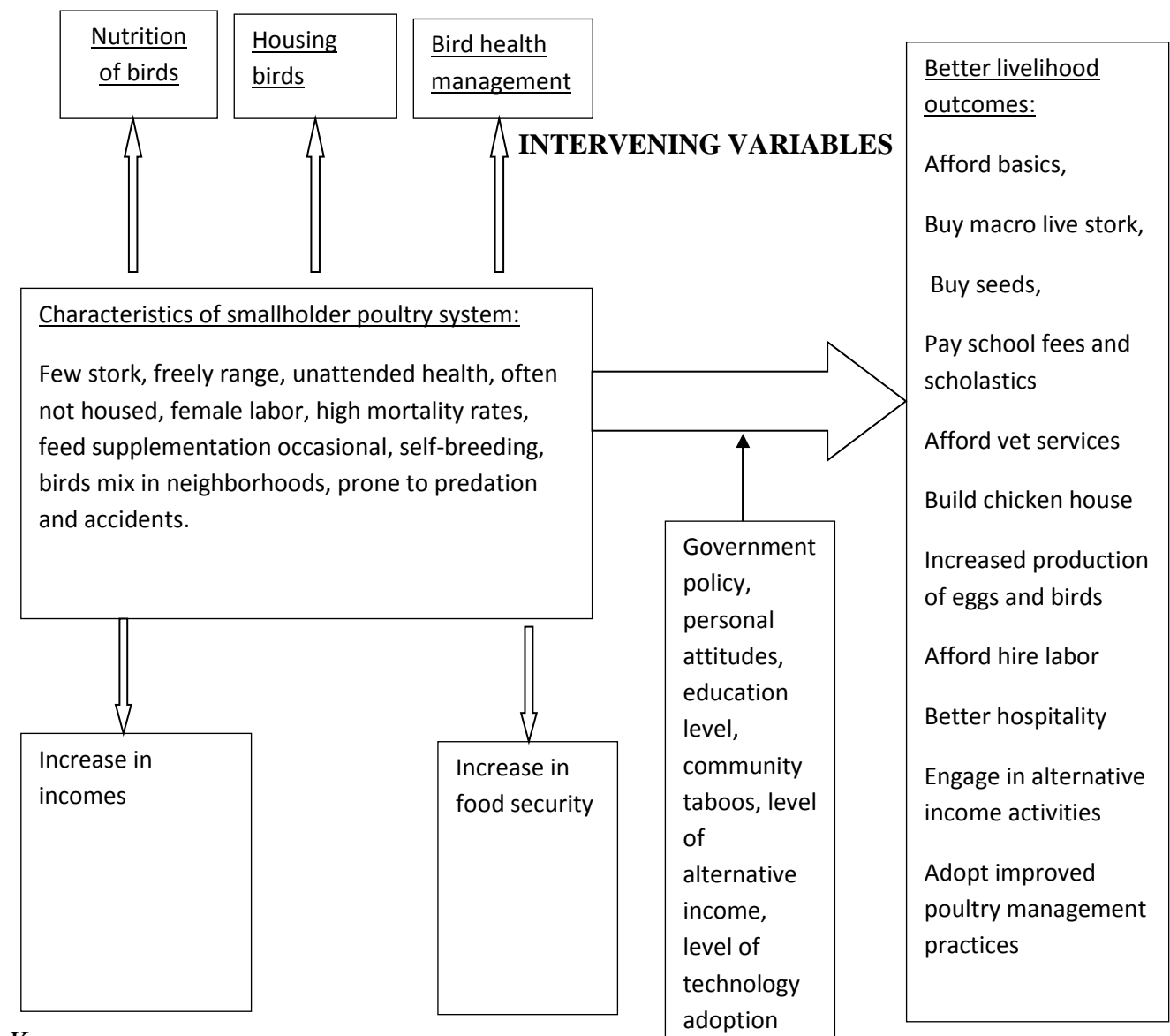
1.2 Conceptual framework

The conceptual framework illustrating typical smallholder poultry production in the study area is as illustrated below.

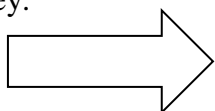
Conceptual framework of small holder poultry system

INDEPENDENT VARIABLES

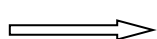
DEPENDENT VARIABLES



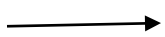
Key:



Shows influence of management practices of the poultry system (I.V) on Outcomes (D.V.)



Shows influence of the poultry system on famer practices and famer benefits



Shows intervening (I) influence on Outcomes of the poultry system

1.3 Statement of the Problem

Despite the common knowledge that poultry production contributes a lot of social cultural, nutritional, and livelihood benefits to smallholder farmers of Pader district, no systematic scientific study has been carried out to characterize the poultry industry in Pader in the recent times.

There was therefore, need to carry out a detailed scientific study of smallholder poultry production system so as to explore; the current management practices, the general characteristics and distribution of poultry populations available, gender and labour requirements operating at household level, extent of government policy implementation to support poultry production, sources of knowledge /advice for poultry farmers and the players in agricultural input and market regarding smallholder poultry systems. This was intended to produce baseline data that could inform future policy makers, technical agricultural extension agents, the private sector actors, academia and the smallholder farmers themselves on the success of any actions taken for their betterment and general rural development.

Inadequate data to inform decision making and development interventions in the poultry sector is critical hence, the need for this study

1.4 Objectives of the Study

1.4.1 Major Objective

The major objective of this study was to characterize the poultry industry in Pader District.

1.4.2 Specific Objectives

- (1) To identify poultry management practices in smallholder poultry farmers in Pader District.
- (2) To assess social economic contributions of smallholder poultry farming in Pader District.
- (3) To establish major challenges faced by smallholder poultry farmers in Pader District.
- (4) To analyze the effect of management practices on egg production and poultry numbers.

1.5 Research Questions

- (1) How do small holder poultry farmers generally manage their poultry stock in Pader district?
- (2) What are the social economic contributions of smallholder poultry farming in Pader district?
- (3) Which major challenges are faced by smallholder poultry farmers in Pader District?
- (4) How does management practice impact on egg production and poultry numbers?

1.6 Scope of the Study

The study was about characterization of the poultry production system among smallholder farmers and was conducted in Pader district, Northern Uganda. The study was conducted in one Sub County of Pajule as a case study. The study covered all the 5 parishes of the Sub County.

The study explored practices of smallholder poultry farmers at household level the population left the Internally Displaced Persons' (IDP) Camp situation in 2008 and now enjoy individual homestead settlement pattern; practicing different farming systems including poultry rearing. The study looked at management practices of the smallholder poultry farmers particularly; nutrition/feeding of poultry, housing of poultry, and management of bird health and how these practices impact on household income, work and decision making.

1.7 Significance of the Study

It is expected that knowledge, findings and recommendations generated from this study will enable smallholder poultry farmers adopt innovations that increase the sustainability of their farms, find innovations and benefits of information sharing, and in a way improve the social economic and food security situations from poultry production. The study findings will be produced and a copy offered to the production and community development departments of Pader district and the sub county leaders of Pajule where the research was carried out. This way both sub county extension agents and farmers will be able to share study findings. Current Government livelihood development projects such as NUSAF III (Northern Uganda Social Action Fund) and OWC (Operation Wealth Creation) that directly offer livestock to farmers

alongside other agricultural inputs can use these study findings for improved targeting of project beneficiaries and improved procurement of better poultry stock in their community procurement processes. For example, why target a farmer who is not willing to construct a simple housing unit to benefit from a stocking program involving receiving of poultry or even heifers. Another set of Government affirmative action programmes such as NWEPP (National Women Empowerment Programme) and YLP (Youth Livelihood Programme) housed in the Community Development department, can borrow a lot of learning from the findings of this study in case they decide to advise enterprising target beneficiaries to use poultry enterprise since it offers quick returns and shorter pay off periods compared to other long term ventures that have turned frustrating to the intended efforts of the revolving funds. Since most poultry farmers have been practicing with limited innovation necessary for achievement of commercialization, it is hoped that those who adopt innovations recommended in this study in regard to bird's nutrition/feeding, housing, and health care, will be able for once again see business sense that comes from a change of their usual practices to adoption of practices that make poultry production more sustainable and highly productive. Government and Development partners will be able to use findings from this research as a baseline for proposals and implementation of future poultry stocking projects and specialized services delivery strategies for the improvement of rural livelihoods among poultry farmers.

1.8 Justification of the Study

Small holder poultry keeping in the rural settings play a key role in securing incomes, employment, and food of the people. In Uganda in particular, stallholder poultry farming is key in the livelihoods of the rural poor and Northern Uganda, Pader district inclusive just emerging from a decade of LRA war and has high poverty levels having lost macro livestock is now trying to generate wealth from micro livestock that includes poultry. Despite being at the center of livelihoods of most households, poultry production systems in Pader have not been properly characterized for appropriate interventions by various stakeholders. The current effort by government of Uganda to restock livestock to the Acholi community including Pader is focus on giving only cows (local zebu heifers and long horned Ankole heifers) and sometimes goats. Nothing is said about poultry and even when tried it is the exotic broiler or layer storks and not the indigenous poultry, due to lack of baseline data on poultry which justify the need to carry out

this study. The available data on livestock census (1998) and National population census (2014) rates poultry farming highly with over 50% households occupied in it countrywide and close to 99.8% households in northern Uganda where Pader district belongs, engaged in it. The small holder poultry industry serves a whole range of gender i.e. children, women, men, youth, widows and even orphans can each of the gender rearing and exercising decisions basing on the poultry stork they own. It was therefore important to study and find out how poultry production impacts on gender roles at house hold and community levels. Poultry farming is not an isolated enterprise; it properly integrates within the ecological settings of both crop and livestock on farm therefore, contributing to healthy co-existence especially in terms of soil health. A number of small holder poultry farmers are not aware that they could make business from their undertakings if only they took steps to improve productivity of their stork and also increase production through better practices. This study has findings and recommendations that can bring out the business sense of rural poultry production which if adopted will be able to see many in the rural setting change their wealth status for the better as individuals, households and the community develops as a whole. A wealth of information was generated in addition to general management practices, social economic contributions, and challenges burdening the poultry production and impact of certain management practices on poultry egg production and poultry numbers and accompanying recommendations on what needs to be done to improve the industry. It was therefore very important to carry out this research on characterization of poultry industry in Pader which resulted in a wide range of baseline data usable in academic research, targeted agricultural extension services, development of policy, farmer practices' improvements and poverty alleviation and general development of the local economy.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter is a discussion of literature related to characterization of poultry industry among smallholder farmers as studied by other scholars in different locations. The review of characterization of poultry production system among smallholder farmers is discussed under four specific study objectives namely; poultry management practices, social economic contributions, impact of poultry management practices on productivity and major challenges. Poultry management practices under review include; provision of care of the flock, nutrition or feeding, provision of housing or shelter and disease control and prevention strategies in place. Further review is on the analysis of the impact of certain management practices on egg production and poultry numbers

2.1 General poultry management practices of smallholder farmers.

Poultry management is the raising of domesticated birds such as chicken, ducks, turkeys, and geese for the purpose of meat and eggs. Annually more than 50 billion birds are raised for both meat and eggs (source; Wikipedia). Rural smallholder farmers have always reared poultry since time immemorial, no wonder that to date poultry husbandry continues to gain significance.

Smallholder farming is usually a small farm supporting the needs of a single family. It is characterized by a mixture of crops and poultry all of which are on subsistence scale. The acreage relies exclusively on family labour, the birds may be kept on free range and the household may be marginal or poor.

According to Mwiti & Mugegi (2015), there are three poultry rearing systems employed by rural farmers; extensive or free range, intensive and semi intensive.

Under free range systems stock for breeding are obtained from neighbors and relatives locally and cheaply. Flock sizes in free range system are highly variable three to ninety-seven birds (3 – 97) according to Soyaiya *et al*; (1999) and a range of six (6) according to Kitilya (2000). Free range poultry farming allows poultry to roam freely for most of the day time though they may be confined in sheds at night to protect them from predators and bad weather.

According to Food and Agriculture Organization (FAO) report of 2009, *on poultry genetic resources and small poultry production systems in Uganda*, 84.2 % of local poultry are reared on free range and the poultry are predominantly indigenous type. It is generally accepted and confirmed from numerous studies that 60% – 80% of rural households in developing countries rear poultry under scavenging and free range systems. This system is also referred to as village poultry although widespread in urban areas too. In fact, households from all income levels poor or rich engage in these practices depending on availability of scavenging feed resources.

Rural poultry production by free range as reported in the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) Report of 1993, on *Uganda National Census of Agriculture and Livestock* (NCAL) is practiced in all the nine agro ecological zones of Uganda and constitutes relatively higher populations of the total poultry. The same trend applies even to the greater Africa continent and (Kitalyi, 1993) pointed out that in nearly all African countries, poultry production in the rural areas is predominantly based on free range system utilizing indigenous type of domestic fowl.

In semi intensive systems farmers mostly keep layers and broiler chicken breeds. These are provided with shelter and serious strategies are put in place to control diseases while feeding is strictly on formulated poultry feeds. Small scale semi scavenging systems using indigenous birds usually provide shelter using various locally available materials such as wood and leaf from local trees, and shrubs

Common species of domestic poultry and shelter

It was found out that of all available species of domestic poultry, chicken were the most preferred and their populations were actually higher than any other poultry reared by smallholders. The reason as to why chicken particularly indigenous type were preferred for rural production was because of their uniqueness as good foragers, efficient mothers and hence require minimal care to grow. They offer another advantage of low or even no cost of acquisition of new stock since they characteristically breed their own replacement stock. They are therefore the most suitable to raise under village conditions.

Management practice on bird housing

Farmers practicing small scale scavenging systems use locally available materials to improvise bird housing. However, birds in household flock are typically housed only at night and left to move out in the morning to look for their own food during the day (Phil & Robert, 2013). The night shelters in most cases are rudimentary coops often raised from the ground and provide protection against bad weather and predators such as reptiles (Hunduma, Dinka *et al*, 2012). A number of farmers provide separate overnight houses for chicken in the main house, kitchen, hand woven basket and bamboo cages (Hunduma *et al*, 2010). It has been studied and findings show that Indigenous poultry can maximize their production potential and perform better under good housing protected away from predators, bad weather and thieves (Ahlers *et al*, 2009). Ahlers *et al* (2009), further observed that where no shelter is provided the birds sometimes shelter at night in the farmers house with family members. Muchadeyi *et al*, (2004) also mentioned that a significant number of farmers resort to share housing with chicken. This is especially preferential protection to mother hens and young chicks by nature of their high vulnerability to predators and harsh weather conditions especially at night. According to J.Ilangot.A, Etoori.H, Olupot.J and J.Mabonga, (n.d) in the study of *rural poultry production in two agro ecological zones of Uganda*, the provision of housing for chicken in agro pastoral zones of Uganda is inadequate (<20%) and also agreed that in most cases birds either shared housing with household members, are accommodated in the kitchen or perched on trees at night.

Housing is essential for protection of poultry against predators, bad weather and shelter for broody and laying hens. It is common for roaming domestic dogs to eat eggs from unprotected chicken laying nests hence negatively impacting on productivity. Where laying nests are not housed, the farmer sometimes prefers hanging these at the verandas outside as slight over hangs from the roof of house veranda. Studies by Mlambo *et al* (2011), *on village poultry production systems* showed that where housing is provided, supplementary feed is used as a tool to attract birds to shelter in the evening for night protection and that up to 90% of farmers provide supplementary feed. Meanwhile the type of supplementary feed varied with season of the year (Muchadeyi *et al*, 2004).

Management practice on bird nutrition/feeding

According to Roberts (2012), in a study on *utilization of poultry feed resources by smallholders in villages of developing countries*, under free range, scavenging birds find their own feeds, they are rarely given kitchen left over and they may supplement with cheap grains or left over grain from farmers own grain production. They are occasionally provided with water. Advantages include low cost of production and breeding their own replacement stock. There are disadvantages too. Since supplementary feeding is optional, weaker chicks and growers risk dying of starvation when there is competition for scavenging feed. Growth and survival of chicks increases if they are given preferential access to household refuse supplemented with proteins. Ultimate death of chicks and growers is usually due to predation.

Considerable mortalities are high due to poor nutrition, poor access to water and diseases. Possible feed resources for scavenging poultry are clearly identified in several studies and these include; household waste even if from household that do not keep poultry, materials from the environment e.g. worms, snails, insects, green picks and seed, grain products from cultivation, and cultivated or wild fodder resources (FAO; 2013). The supplementation of free range poultry production system consist ; household waste, maize sorghum, millet, and sunflower seed while scavenging remain the major feed system.

Management practice on health of scavenging birds

In most African countries, scavenging chicken have no regular health control programme as was reported by (Awuni, 2004). And a majority of smallholder producers never vaccinate their birds and fewer ever contact a veterinary service provider therefore common diseases are prevalent throughout the year but more prevalent in the dry season. Common diseases are NCD (New Castle Disease), fowl pox, coccidiosis, and infectious bursal disease (Chabeuf 1990, Gueye 2002). Spradbrow, 2001; Udo *et al*, 2003, all mentioned how NCD is the main killer of village poultry.

Controlling NCD was recognized as a single and most effective intervention to increase production of village poultry. Improved poultry husbandry practices secure the health of birds only if NCD is under control. NCD affects birds of all ages; prevention programme should

include vaccination, good sanitation and implementation of a comprehensive bio safety programme (Butcher *et al*). There is no specific treatment against NCD. A study in Ghana revealed that up to 80% population of chicken is annually lost due to NCD and a number of other manageable causes while fowl pox remains a major cause of death in chicks (Awuni, 2004).

According to reports by (Chabeuf, 1990; Gueye, 2002), NCD has a potential of wiping out unvaccinated stock by 70% - 80% and hence called it “a most serious epizootic poultry disease”. Common diseases occur throughout the year, but prevalence is high during dry season. They further classified common diseases according to their seriousness in the following order; 1.NCD, 2. Fowl pox, 3. Coccidiosis and 4. Infectious bursal disease. Further findings showed that serious efforts to control these diseases were minimal amongst smallholder poultry farmers. Birds seemed neglected, occasionally received antibiotics intended for human use, a majority never vaccinated their birds and few ever contacted a veterinarian for assistance. The high prevalence of poultry diseases under free range was mainly attributed to un controlled contact of birds from different households and neighborhoods, contact with different birds which could have just been bought from market or received as gifts all of which may be sick and un vaccinated (Terence and Kankya, 2009). Another study blamed the extensive interaction between humans and poultry and between poultry and other animals that occurs in free range as one of the root causes of frequent disease out breaks. These in a way promote exchange of disease pathogens between humans and birds as well as other domestic livestock.eg pigs, cattle, dogs and goats (Petrus, Mpofu and Lutaaya, 2011). This scenario is because free range birds are not kept confined in proper housing.

Ilangot *et al.*, (n.d) concluded their study by mentioning in their findings that predominant health problems of poultry in Uganda are; cough, fowl pox, internal parasites, with NCD remaining as a greatest constraint.

When FAO (2009), reviewed poultry disease control strategies in smallholder poultry production systems and local poultry populations in Uganda, they reported findings that showed that some households apply some disease prevention measures especially cleaning of poultry houses (43.7%) and vaccination (35.7%). Bio safety measures e.g. cleaning using disinfectants, isolation of sick birds. Restriction of entry to poultry houses were lacking or insignificantly practiced.

Earlier similar observation in the use of ash in the control of eco parasites was also given by (Awuni, 2004).

The limited access to veterinary and extension services by a majority of villagers has been found to compound the challenge of disease prevention and treatment even the more. A majority of rural smallholder poultry farmers remain either unaware of benefits of disease control or are unable to access poultry vaccines and drugs hence risk high mortality rates to seasonal out breaks of diseases.

Despite the above mentioned challenge on disease control, rural poultry farmers have ethno veterinary practices that they employ especially in treatment of diseases. In a recent research, Masimba, Mbiri, Kashangura and Mutibu (2011), recognized that this knowledge was passed down orally through generations from grandparents, parents, friends and neighbors. It involves use of plant extracts to make portions that are applied as fresh plant material, or they may be fermented, dried, ground portions mixed with water for administration orally or sprinkled on sick birds. They further recognized that most extracts were from plants except use of soot. These plants include; aloe vera, *sarcostema viminale*, red pepper and *adansoma digitate*.

2.2 Social economic contributions of smallholder poultry farming.

Many scholars have cited the nutritional, social, economic and cultural importance of small scale poultry production systems.

Economic contributions

Poultry have widely been acknowledged as livestock for the poor and are part of most smallholder farming systems. They are mostly considered by most smallholders as supplementary to the main livelihood activities (Kryger, Thomsen, Whyte and Dissing, 2010). The contribution of poultry to incomes counts very much a step-in poverty alleviation while creating wealth especially because the indigenous poultry are very easy to acquire, their reproduction and production are high enough to realize faster income due to low cost of minimal initial investment required (Besbes, 2009). Poultry produced on smallholder farms have long been known to serve the rural population with meat and eggs. Birds and eggs are traded and consumed, the trade takes the form of both cash and barter in exchange for much needed

household items such as food in times of famine and needed services such as labor for opening land under cultivation or even weeding and group harvest of crops during agricultural season. Sale of eggs and live birds is a regular source of income to meet other expenses (FAO, 2013). Many scholars acknowledge and have reported that the prime supplier of eggs and poultry meat in a developing country is the poultry production in the rural areas.

Nutritional contributions

Abera *et al*, (2012) reported the contribution of indigenous and local chicken breeds to consumption of poultry meat and eggs that makes up to 90% of the total rural population. Abera *et al* citing Besbes (2009) alluded that this huge figure of 90% was because of the low level of inputs needed for their maintenance of indigenous poultry therefore rendering their availability abundant in the rural population. Other than supply nutritional needs of the population in the general rural community, consumption of eggs and meat is valuable to the household members themselves (FAO, 2013). This occasionally happens when the family has received visitors who may be of special relation such as distant relatives, in laws, grandchildren and nephews/nieces or even dear friends. It is also common for the family to enjoy special poultry meat to mark celebrations that may be religious or cultural such as the baptism of a family member and also cultural naming ceremony of newly born baby in to the family. It also happens commonly when whole communities celebrate special religious holidays such as Christmas for Christians and other religions functions accordingly. Consumption of poultry and poultry products as part of celebrations to mark ritual functions or secular celebrations strengthens the social bond within smallholder communities. The serving of cooked poultry dishes to share the joy of arrival of important visitors also serves as one way to manage good relationships.

Alem Tadesse citing Tadelle *et al*, (2003), reported that even with challenges of rearing poultry in rural Ethiopia and any developing country, free range and back yard poultry production is very important in low income food deficient countries as an appropriate system that supplies the fast growing human population with high quality proteins. This is especially because these poultry have high fertility, good hatchability, good eggs and good meat flavor.

Social-cultural contributions

Other than consumption, poultry and poultry products are sold and bought to meet social needs and in support of this fact Busuulwa, (2009) clarified that livestock production which includes poultry serve as mobile banks from which funds can be liquidated from sales of animals and birds and their products to serve other purposes. In bigger stage managed relationships such as celebrations to accept a new marriage, live birds are given as part of bride price/dowry.

It has been found and documented that other than nutritional and monetary needs, the smallholder poultry farmers have other benefits that they derive from poultry production. These according to (Ssentunbwe,2006), are functions for which it is not easy to assign monetary values and include provision of manure for crops, use during special festivals to fulfill social obligations and in traditional ceremonies and for treatment of illnesses. Social cultural contributions are also in the form of gifts, dowry and bride price. Social cultural festivities in most African communities have obligatory sessions that require slaughter of one or two birds of a particular color. In their recent research (Kryger, Thomsen, Whyte and Dissing, 2010), termed these as social capital aspects of small holder poultry production used for building social relations with other villagers.

Tadelle & Ogle, (2001) filed the central role played by use of poultry in sacrifices to divinities in some African communities and to ancestors in some parts of Uganda. In some African communities, elders were able to foretell the future through divination rites that involve slaughter of poultry. FAO (2010) citing (Tadelle;2003, Aklilu *et al*;2007) discovered and documented that in Ethiopia local chicken are considered the only birds fit for use in ritual sacrifice and gifts. And because of use of poultry for gifts during religious, festive and social events the prices of birds increase and have on many occasions even doubled.

Accordingly, when (Kryger, *et al*, 2010) confirm that social economic aspects of poultry production are important for building social relations with other villagers. Poultry is used as gifts at weddings and funerals which serve as affiliation and sign of solidarity. These gifts of live birds are actually a tool for strengthening reciprocity and social network i.e. exchange and gift giving assurances of future possibility of the one receiving or accepting to help in one way or

another when trouble strikes. When given to a distant relation, he/she also accepts obligation and remain assured to be obliged to help in future (FAO/IAEA,2002). This reciprocity is a kind of safety net mechanism for the rural poor to use to cope with vulnerabilities and remain socially inclusive.

Gifts of live birds are also offered to neighbors to thank them for help offered with agricultural work in most African communities (Naidoo, 2003). In some cases, the package is usually a full meal of poultry dish plus local beer to thank them as they take to rest from agricultural work. A relative who does not have their own stock is also given so that they are able to start rearing and grow numbers of their own. It is common to offer young girls getting married to start their own home so that they somehow exercise a small measure of economic independence from their newly married husbands. In conclusion it has been common practice to use chicken as gifts par excellence in most smallholder societies served to significant guests e.g. important kinsmen in recognition of their titles therefore reinforce social networks and kinship ties.

Least mentioned, it is also common knowledge that cocks serve as alarm clocks of any rural smallholder community (Mathius, 2006). The crow of mature cocks precisely happens to estimate the clock hours of day starting from early morning till evening times.

According to a report on some African countries by FAO (2010) Citing Aklilu *et al*, (2007), live birds are commonly presented to a sick person. The locals regard it as a pleasantry gift that can lift the moods of a patient but also provide good quality food rich in proteins to enable fast recovery from sickness. Findings by most scholars, on ownership of poultry under smallholder management revealed that everywhere in the world, day to day care and management is undertaken by women and assisted by children. These chores include; feeding, cleaning of the poultry houses, and even application of treatment once birds are sick. Men assist in making shelter and taking poultry and poultry products to the market for sale (FAO; 1998, Bravo-Bauman; 2000, and Mathius; 2006). FAO (1998), continued to explain the paradox that despite hard work done by women, they do not necessarily wield ownership power and decision making power regarding proceeds from sales and general use of poultry products. This is in agreement with (FAO; 1998, Gueye; 2003a). Further when ownership was apportioned between gender according to Sonaiya & Swan, (2004), women and men owned a majority of poultry while

children ownership remained a meager percentage. Swan (2004), also revealed that men come in to assist in management only when the poultry enterprise becomes larger and the production is on commercial extent. Reasons that support women ownership in management of poultry under smallholder system are because it requires less investment initially when establishing, they are not highly valued in terms of social capital so men prefer to own larger livestock such as cattle though women may add a few goats in integration with poultry (Villareal,2001; Joensen; 2002, Thomsen; 2005). Other scholars cited more supporting reasons for women ownership of poultry to include the advantage of quick and frequent returns of poultry enterprise naturally which actually fits with day to day expenses of women at household level (Todd; 1998 & Thomsen; 2005). Since poultry are of little capital. Villareal (2001) eluded that in case of loss to predators, thefts and diseases these losses are also considered as small. Another reason favoring women ownership and care of poultry as was reported by Bush (2006), these birds are reared naturally at homestead, so women find convenience to manage as they go about with usual household chores so women do not need to take extra time outside home as compared to other income generating businesses.

Environmental benefits

Since free range production does not call for intensive use of veterinary inputs and chemicals, Vander sluis, (2007) reported that scavenging based rural poultry production is the most environmentally efficient animal protein production system especially because it uses less water and is most environmentally friendly. Mekonnen G (n.d.) also agrees that smallholder chicken production is environmentally friendly and further, outlines scavenging feed sources to include; grass, worms, and harvest left overs. According to (FAO, Busuulwa; 2013), poultry litter is excellent for manure. Furthermore, as read in a posting in the *allafrica.com* website, Stella Naigino told a story of how a farmer from Kamonkoli, near Mbale town, Eastern Uganda tills four acres of land maximized profits up to tens of million Uganda shillings because of integrated usage of poultry manures for soil enrichment.

Poultry rearing has another benefit that is aesthetic and emotional in value i.e. human animal relationship e.g. cock – fights (Geertz, 1992). Here men give masculine power to their cocks.

The diverse colour of their plumage also provides items used for beautification during cultural dances and is also interesting to watch them grace the compound with beauty while alive.

2.3 Major challenges faced by smallholder poultry famers.

Critical constraints of smallholder poultry production system are partly due to poor management practices in particular; predation, lack of proper health care, lack of supplementary feeding and poor housing. Other constraints not related to management weaknesses are; inadequate access to markets, health care extension information, and credit for operation. Hence efforts to reduce these constraints definitely lead to sustainable rural smallholder poultry production (Gebre-Egziabher, 2007).

R.Mwiti & .Mutege, (2015), classifies problems facing smallholder poultry famers as major and moderate. The main problem of scavenging poultry system is pests and diseases due to exposure during scavenging. And the moderate problems are lack of extension advice from extension officers, heavy losses due to predation, lack of labor, limited availability of breeding stock and in adequate housing.

FAO (2009), weighted this challenge as; lack of animal extension services (20%), keeping birds at free range (8%), ignorance of farmers (10%), inadequate drugs (20%), lack of cooperation among farmers (7%), unavailability of vaccines (6%), and corruption (2%). The disease burden includes cough, diarrhea, internal parasites and Newcastle disease (FAO, 1998).

FAO, (2009) report proposed increase of access to credit services as a stimulus for increasing productivity and a tool to manage farm constrains.

Statistical data showing the economic sense of rural poultry systems in the country analysis of contribution to GDP (Gross Domestic Product) is hard to assemble this is due to the high illiteracy rate among local poultry keepers which complicates record keeping. MAAIF (2006) report on review of the poultry sector in Uganda observed that complicated local reports fail to serve for evaluation of the sector economic GDP. FAO (2009) report puts a majority of smallholder poultry producers at a literacy level of primary level. And FAO (2010) continues to lament on the low literacy rates among smallholder farmers and how it greatly impacts negatively on record keeping let alone adoption of new knowledge transfer processes.

Inadequate animal health extension is one of the challenges faced by rural smallholder farmers thereby leaving a majority with inadequate knowledge on disease control. In this scenario delivery of a package of extension messages through radio becomes the most probable way of reaching rural poultry farmers. Sankhyan et al as posted in the RRD website <http://www/rrd.org> recommends development of suitable extension message packages of practices for rural poultry farming that address issues like diseases management. National census of Agriculture and Livestock (NCAL) 1990/91, carried out by UBOS and posted in their website ubos.org, also reported the use of radio besides farmer to farmer messages as the most important ways through which rural households receive agricultural extension services.

FAO (2003) in the *study of village chicken systems in Africa* identified a major constraint of marketing as lack of organized marketing channels for poultry and poultry products. Rural poultry farmers have difficulties in accessing markets with better prices simply because big traders based in towns often prefer using young boys to buy from farmers such buyers in turn prove to be middle men offering low prices.

Since rural poultry production under free range system is characterized by birds roaming within the village and outside the confines of the owners' home yard, they are bound to cause conflict as they feed on neighbors flowering crops and dying grains. Findings of characterization study of small poultry production and marketing system posted by Mekonnen G, (n.d.) in the *poultry science journal*, agreed that neighbors often complain of chicken damaging their crops especially during flowering. This is especially true on crop pulses and legumes such as groundnuts, beans, soya and cowpea. It only becomes safe for farmers to plant these in gardens far from homesteads.

According to El Haji Fallou Gueye (Dr), (2012), severe rearing losses can result partly from high mortality of young chicks that can reach up to 80% by the eighth week. The cause of these losses is a combination of factors that include diseases, harsh climatic conditions in the absence of housing and predation. There are challenges related to inadequate housing of birds such as thefts, death from adverse weather conditions and predation. The threat from predation is real. It includes dogs eating eggs from the birds nest (wild animals catching birds as they scavenge in bushes, eagles and crows snatching young chicks (Awuni, 2004).

Accordingly, Ilangot, *et al* (n.d.) estimated 80% of domestic birds' population in agro pastoral zones in Uganda lacked housing and possibly contributed to a chick mortality estimated at 36%. Housing is essential to provide shelter for egg laying and broody hens (Hunduma *et al*, 2010). In the absence of housing the egg laying hen is forced to nest in bushes where they get risk of exposure to both domestic and wild predators or else share shelter with members of the household.

The risks associated with free range or scavenging system is greater during periods of scarcity of scavenging feed resources. Since supplementary feeding is optional, weaker chicks and growers risk dying of starvation when there is competition for scavenging feed (Hunduma *et al*, 2010). Even with laying hens, absence of supplementation on feeding during scavenging hinders them from attainment of full performance capacity. Rahman and Soerenen (1997) mentioned that scavenging laying hens can find approximately 60-70% of their total feed requirements while (Jensen, 1996) estimated 30% - 70%. Thus providing a supplementary feed makes up to the deficit percentage nutritional requirement for full egg laying potential. Besides the actual lay performance, poor nutrition retards the onset of reproduction by prolonging the age of onset of maturity in growers. The characteristic lack of health control programming in scavenging poultry system makes poultry on this system very susceptible to attack by a wide range of diseases. According to findings on a study on rural Beldi chicken and turkeys of Morocco, Benabdeljelil and Arfaoui (2001), found diseases as the main cause of mortality and can affect up to 77% of chicken flock in rural poultry. Losses up to 80% population of chicken to NCD (New Castle Disease) and other diseases can be registered annually with fowl pox being a major cause of death in chicks. Awuni, (2004). While Chabeuf (1990), estimated up to 70% - 80% losses of unvaccinated stock to NCD. Major risk factor associated with transmission of NCD are exposure to natural environment (including wild fauna), flock of various ages mix while scavenging, mix with susceptible new hatches, and contact with the infected either through exchange of live chicken and poultry products or movement between households in the village.

A study by (Petrus *et al*; 2011) blamed the extensive interaction between humans and poultry that occurs in free range to be one of the root causes for frequent disease outbreaks. These in a way exposes danger of exchange of disease pathogens between humans and birds they also

frequently mix with domestic livestock.eg pigs, cattle, dogs and goats. This scenario is because free range birds are not kept in proper housing. Despite the abundant availability of ethno veterinary resource in villages, knowledge on their use and actual doses is not clearly known. There is need for research and knowledge dissemination on these practices for better disease control and treatment amongst birds on smallholder poultry farming systems.

2.4 Effect of management practices on egg production and poultry numbers.

The analysis of poultry practices employed by smallholder poultry farmers shows significant bearing on poultry production in terms of eggs produced and number of birds i.e. flock sizes. The study focusses on the analysis of farmers' poultry practices with specifics on three categories i.e. feeding/nutrition, housing and maintenance of health. Analysis of literature on other research findings in this section focused on impacts derived from basically three practices regarding how smallholder poultry farmers care for birds' nutrition, housing, and disease control and prevention. The analysis reflects how each of these management practices directly or indirectly impacts on two production and productivity parameters of egg production and numbers of live chicks and adult birds. According to Alem Tadesse (2015), studies on village chicken in Nigeria, the three parameters under this current study were listed amongst others to be major constraints to production and productivity of local chicken. Actually findings from this study concur with (Alem, 2015). Earlier work by Alem (2014), reported that indigenous chicken being a function of natural selection, have poor performance as seen in terms of slow growth, pronounced broodiness, small body sizes and low production of meat and eggs. This inherent performance can slightly improve with provision of care practices which were considered in this study amongst others.

Focus on feeding/nutrition of birds;

It was found that egg laying chicken require a complete balanced diet to sustain egg production at a maximum. According to Jacob *et al* (2011), inadequate nutrition can lead to hens stopping laying whereas feeding on a salt deficient diet can lead to a decline in egg production. Further analysis shows that laying hens have high requirement of proteins, vitamins, and minerals. Therefore, low dietary protein leads to poor egg production and low egg hatchability. And low egg hatchability definitely translates to few poultry i.e. small flock sizes. The same source,

(Jacob *et al*,2011) concluded their study findings in the Florida back yard chicken by revealing that keeping laying hens for several hours out of feed coupled by lack or denial of clean drinking water results in a decline in egg production. Diet also affects egg composition and the quality of eggs produced. According to Harry *et al* (2017), the diet of laying pullets and hens has an appreciable influence on let alone the egg numbers but also on their size, taste, colour and odor. No wonder that diet on plenty of fresh green feeds e.g. grass causes egg yolk to be deeply colored yellow.

Further analysis has revealed the effect of nutrition on the flock size that a family can optimally maintain. The flock size of 5 – 20 birds on back yard has been found to be what a family can optimally maintain with minimal inputs of labour and feeds. However, increase of flock size beyond 20 leads to malnutrition in the absence of feed supplementation (Branckaert *et al*, 2000).

Care must be exercised to ensure that feed offered to poultry is fresh and free of molds. According to Jacob *et al*, (2011), poultry feed stored for more than two weeks risks getting moldy and definitely declines in vitamins content. They concluded by saying that wet feed must be discarded as they risk getting mycotoxins from molds. The problem with mycotoxins has been found to have hormonal effects that cause a decline in egg production.

Lack of water is similar to inadequate food in importance. Lack of water for many hours causes decline in egg production. It is well known that feed supplementation is necessary to a minimal level of 30% in egg laying hens since they are capable of scavenging 70% of their feed requirement. Good lay and hatchability results in sustainably high production in terms of egg clutch sizes, live chicks and adult birds.

Focus on shelter for birds;

Shelter or housing is very important in the management of poultry as it provides three major protective services i.e. protection from extreme weather conditions, diseases and predators. Shelter promotes increased productivity of any given poultry stock in terms of egg numbers successfully hatched and poultry numbers within the poultry size.

Taking the case of predation, (Bourzart and Saunders 1989), put possible losses due to predation at a figure as high as 70%. They further listed predators of poultry to include; snakes. Rats, dogs, raccoons and foxes. These present losses in both eggs and young chicks. The same source quoted, suggest construction of poultry housing as a great solution to problems associated with inadequate poultry housing. All in all, a good housing /shelter provides protection while also controlling thieves whose target is usually either eggs or live birds.

Much as thieves negatively impact on poultry eggs and numbers, intensive confinement in large numbers according to FAO *Agricultural services bulletin* (hotmail), leads to accumulation of filth (ammonia and diseases) and a section of frustrated birds that constantly peck on each other causing injury and deaths which automatically negatively impacts on numbers of eggs and live birds. The young chicks and broody hens are usually vulnerable to extreme weather conditions especially excessive wind, sunlight, heat and rain storms. A good house in addition from protection against these weather hazards also prevents thieves all of which promotes high poultry productivity in terms of eggs, chicks and live birds numbers.

Focus on maintenance of poultry health;

Healthy hens reared according to routine vaccinations especially against the deadliest NCD disease, have a chance of producing in large numbers hence high egg production and large flock sizes. Sick poultry storks often die if not treated and in extreme instances, other hens have to be sold to treat the sick ones hence reducing the number of birds a smallholder farmer may have. According to Rushton (1996 b), Variability in flock sizes is dependent upon availability of feed, the kind of management practices and the chicken production system. However, according to (Sonayi and Swan 2004), flock sizes on family scavenging system in Africa rarely exceeds 20 birds. A number greater than this calls for systematic prevention of diseases through routine vaccination programs, routine disinfection using formaldehyde and other locally known measures for strict control of pests, worms and predators and serious feed supplementation if the famer is to boast of high numbers of eggs, chicks and live birds. Recent studies on chicken production systems in Ethiopia (Moges et al., 2010) established average flock sizes of 13 per house hold from a range of (1 - 57), to be sustainably healthy with an average clutch size of 16

from a range of (8 – 28) eggs per clutch laying optimally at 4 clutch periods per year. This came possible with access to participate in an organized value chain for marketing.

In general, well fed chicken have improved growth rates and are very fertile and also less susceptible to diseases and parasites. The findings from this research showed that farmers consciously supplemented on feeds using kitchen left over and home saved grains to a high percentage of 86% of respondents though a remaining 14% did not care. This under ideal conditions promotes high productivity in average number of eggs and numbers of chicks and live adult birds owned by a farmer.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter explains the methods which were used in the research design, the research population and sample size from the population, plus tools used to carry out the study. It also explains how the data was collected and finally analyzed to produce a report of research findings.

3.1 Research Design

A cross sectional study was carried out on purposively selected poultry farmers in Pajule Sub County to characterize the poultry production. The study was conducted using a case study design. This is a descriptive and holistic analysis of a single entity of a bounded case (Yuko & Onen, 2008). During the research, Pajule Sub County was selected as a case representing the Pader district this is because of the unique nature of Pajule being a large sub county with the highest population and depicts both rural and semi- rural population. In this way data from the sampled Pajule sub county was treated with in depth analysis so as to depict the picture of the small holder poultry farmers of Pader district.

3.2 Area of study.

The study area was Pajule Sub County. This sub county is 12 kilometers from Pader district headquarters in the North West direction from the district headquarters it is actually located in the middle of the district. It has both rural and semi-rural characteristics. It is the sub county with the highest population having six (6) parishes and a population of 4,177 Households. All the 379 respondents were chosen from Pajule Sub County. The map at the appendix provides the details of location and campus direction of Pajule from the district headquarters at Pader Town Council.

3.3 Study Population.

Data available from the recently concluded national census showed that Pader district had a population estimated at 178,917 people and a total of 34,233 households (UBOS, 2014). The same source by (UBOS, 2014), showed that the total population of the case study sub county i.e. Pajule was estimated at 22,713 people and 4,177 households. From these data, a sample for use in the study as the sample size was determined

The table showing estimated population of Pader district and Pajule Sub County as extracted from (UBOS 2014) data is shown below.

Table A: Pader Households and Population Data. Source OBOS Northern Report 2014.

Administrative unit	Total Population	Total households
1.Acholibur	14,038	2,625
2.Angagura	8,973	1,728
3.Atanga	15,465	2,822
4.Awere	19,553	3,781
5.Laguti	13,504	2,531
6.Lapul	18,258	3,610
7.Latanya	15,156	2,856
8.Ogom	8,551	1,520
9.Pader	9,494	2,022
10.Pader Town Council	13,382	2,705
11.Pajule	22,713	4,177
12.Puranga	18,917	3,846
Totals	178,917	34,223

3.4 Sampling Procedures.

From the study population of Pader District which stands at 34,233 households, the sampling tool given by (Krejcie and Morgans, 1970) was used to scientifically determine the sample size of study respondents. Using the Krejcie and Morgans (1970) tables, where N stands for population and S stands for the corresponding sample size to be picked out of the N population. Since the population of Pader district is estimated at 34,233 households (UBOS, 2014), the S value on the sampling tool that falls between 30,000 and 40,000 (Krejcie and Morgans, 1970)

corresponds to 379. The 377 households therefore, were used as the sample size and all were taken from the case study area of Pajule Sub County.

Attached in the appendix is the sampling tool as per (Krejcie and Morgans 1970)

3.4.1 Sample size.

From use of the sampling frame tool provided by (Krejcie and Morgans, 1970), a sample size of 379 was arrived at and care was made to ensure that all the 6 parishes were represented in this sample of respondents for questionnaire administration. Altogether 379 poultry owning individual farmers each representing a different household were interviewed by administration of the structured questionnaires. Overall out of 4,177 households in Pajule Sub County (UBOS,2014) only 379 households and owning poultry were considered to participate in the study and this closely represented 10% of the population of households in Pajule Sub County.

3.4.2 Sampling Techniques.

The sampling techniques employed were two i.e. purposive sampling technique and simple random sampling technique.

According to (Yuko and Onen, 2008), in the purposive sampling technique the researcher deliberately chooses who to work with in the sample for the purpose of collecting focused information while the researcher can save time and money to their advantage. For this study, purposive sampling helped in selection of Pajule Sub County out of 12 administrative units basing on its uniqueness and even though all the parishes were represented, only poultry practicing famers were included in the respondents so as to collect information on their practices for the characterization of the poultry production.

According to (Yuko and Onen, 2008), simple random sampling is the selection of a sample from the accessible population without bias. For this study, simple random sampling helped in assignment of respondent households to research assistants so as to eliminate bias during data collection. The willing farmers were subjected to randomly pick of folded papers written in numbers showing order of questionnaire interviews from number 1 up to 379 and they were visited by the research assistants in that order.

3.5 Data collection Methods and Instruments

Data was collected using structured interview schedule. A questionnaire (Appendix I) was administered to purposely selected poultry farmers. The questionnaire was administered in the local language (Acholi) by trained research assistants to each of the respondents at the home of each respondent to generate knowledge about the poultry production system they practice.

3.6 Quality Control Methods

To ensure quality control, I recruited research assistants who are themselves extension workers in the district. They were trained before sending them to the field. The period of engagement was made short and I engaged research assistants to complete the whole exercise within a period of four days and ensuring that each worked independently covering own parish and administering a minimum of 25 interviews per day. At the end of every day, I conducted filled questionnaire review and had debriefs with the research assistants to ensure that errors committed were corrected and ways of avoiding repeating the errors agreed upon. Data collected was kept away every day after returning from the field while new tools (interview schedules) were issued every morning at the time of departure to the field. This was done to guard against the temptation of using filled interview forms to prefill new interview schedules. Whereas structured interviews were conducted by field assistants, I developed the tool and pre-tested it. The selection of study respondents was done using simple random sampling in all practicing poultry farmers in the area of study.

3.7 Data Management and processing

Collected data was entered in excel work where from it was coded to group similar responses. Later, coded and cleaned excel worksheets were entered in SPSS for analysis.

3.8 Data Analysis

Data was analyzed using qualitative and quantitative methods to derive descriptive information in ways of percentages, mean and median numerical reports illustrated by tables and a number of findings were also narrative. While analyzing the data manual coding and tallying of similar information was done in both data entries in excel and SPSS. Multivariate analysis was conducted using 95.0% C.I. to establish the significance value, upper and lower limits. Final analysis done in SPSS software determined significant p- values.

3.9 Ethical considerations

I was able to maintain ethics by ensuring cordial handling of respondents and all participants, keeping of time as scheduled, request of consent and voluntary flow of information. The participants were kept anonymous as their personal names were not recorded in the research instrument where personal information was required. It was only personal information required for study purposes that was solicited. The research tool possessed introductory notes that ensured the secrecy of data collected and none abuse of information through other means not meant for the study. Voluntary participation was requested from interviewees the researcher provided sufficient information about the study to enable participants give informed consent and in case any declined he/she was allowed to turn away in peace.

3.10 Limitations of the study

The study was concluded in a longer time due to initial unforeseen delays in taking off. Data collection was short and took four days instead of three weeks as earlier planned because research assistants were also fulltime employees and only took time off their work to assist in data collection. The attitude of some respondents affected the quality of data collected from them especially that a majority were illiterate and tended to expect pay which was not provided for. There were limitations in budget and transport such that the researcher had to hire three motorcycles for use by data collectors. Further budgets were needed to enable the researcher hire SPSS consultant when it came to data analysis. There were also limitations when the researcher could not access university and supervisor timely since it involved moving from rural Pader to Kampala many times.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.0 Introduction

This study characterized the poultry production system and practices of smallholder farmers in Pader District. This was in the light of emergence of smallholder communities from a decade long war that robbed them of macro livestock and they are only rebuilding their wealth with micro livestock that includes poultry. The research explored poultry management practices, identified social economic contributions of poultry, challenges faced in poultry production and how some management practices impact on poultry production numbers. The data collected was analyzed and presented using tables, percentages and p-values for significance at 95% with 5 % of error. This chapter now present results in the analysis and discusses findings according to the study objectives.

4.1 Poultry Management System and Practices by Smallholder Farmers.

The management system across the study area was predominantly free-range. The free-range system accounted for over 98% of the poultry management in the study area while fold unit, deep litter and run systems collectively accounted for fewer than 2%. This concurs with Kitanyi A.J. (1998) who gave the African context of rural poultry as predominantly free range, though FAO (2009) gave a lower figure of 60% - 80% but with reference to all developing countries and 84.2% for Uganda. Under free range system in the study area up to 97% of poultry famers kept indigenous chicken. This is close to finding in the NCAL report by MAAIF (1993) which stood at 98% for Northern Uganda.

Details are in the table 1 below. The table contains findings on different categories of poultry management variables therein, frequencies as respondents gave information, further analysis of respondent frequencies in percentages and final analysis showing statistical significance of data using p-values. Detailed description of findings under each category and variable are below the table.

Table 1; Poultry Management systems and Practices.

Category	Variables	Frequency	%age	P- value	95%Confidence Interval	
					Lower	Upper
System	Free range Fold Unit Deep Litter Run	368 3 2 1	98.4 0.8 0.5 0.3	0.000	1.727	5.356
Poultry species kept	Local chicken Exotic chicken Geese Ducks Turkeys Pigeons	362 5 0 0 3 3 5	97 1 0 0 1 1 1	0.000	0.381	1.656
Reason for favorite poultry	Affordable and easy to keep Resistance to diseases Cultural Heritage Quick source of income	201 54 35 72	55.50 14.92 9.67 19.91	0.417	.781	2.746
Nature of poultry housing	Kitchen Perch on trees and houses Built poultry house	89 261 54	22 65 13	0.659	.873	4.656
Nature of poultry feeding	Supplement Don't supplement	368 51	86 14	0.003	1.151	3.527
Supplementary feed modality	Feed put in containers Feed thrown on the ground	30 306	9 91	0.005	.450	1.623
Access to VET services	Have Access Don't Access	22 346	9 94	0.496	.345	1.205
Vaccination services	Do vaccinate Don't vaccinate	17 353	5 95	0.004	.481	2.231
Frequency of vaccination	Once Twice Thrice	3 10 8	14 62 38	0.001	.304	1.141

Deworming services	Do Deworm birds	11	3	0.670	.522	1.967
	Don't deworm birds	361	97			
Frequency of deworming	Once	30.	23.80	0.024	0.024	.569
	Twice	5	38.46			
	Thrice	5	38.46			
VET service providers	Government providers	4	16	0.088	0.088	.632
	NGO providers	7	28			
	Private Trained Person	14	56			
Poultry diseases prevalence	New castle disease	346	38	0.850	0.850	.932
	Fowl pox	191	21			
	Gumboro	58	6			
	Mareks disease	4	0			
	Bacillary w disease	7	1			
	Salmonellosis	161	18			
	Infectious bronchitis	93	10			
	Cocodiosis	42	5			
General challenges under poultry disease management by famers	Limited access to VET service providers	199	33	0.190	0.190	0.672
	Limited access to poultry vaccines and drugs	241	40			
	Inadequate knowledge	90	15			
	Lack of money (poverty)	75	12			

Results from Table 1 show that the majority farmers (98.4%) used the free range system of farming which has a significant influence on poultry production (P-value; 0.000 :CI = .727 - .356). This means that we can be 95% confident that the true rate lies between .72.7% - .35.6% which shows that there were strong variations. In addition, the majority farmers (97%) kept the local chicken species which significantly influenced production (P-value; 0.000; CI = .381-

.656). This means that we can be 95% confident that the true rate lies between .38.1% and .65.6 % which shows that there were strong variations. Local chicken were the favorite because they are affordable and easy to keep although such a reason did not have a significant influence on poultry production (P-value; 0.417; CI = .781- 2.746). Most farmers (65%) had their poultry perch on trees and houses as an alternative for poultry housing, and this did not have a significant influence on poultry production (P-value 0.659; CI = .873- 3.56). This means that we can be 95% confident that the true rate lies between .87.3% and .35.6 % which shows that there were strong variations. The majority farmers supplemented feeding for their birds and this significantly influenced production (P-value 0.003). Most farmers (91%) threw feeds on the ground and this had a significant influence on poultry production (p-value 0.005).

However, the majority farmers (94%) did not have access to VET services although this did not significantly influence poultry production (0.496 CI = .345- 1.205) and at the same time 95% did not vaccinate their birds, and this had a significant effect on production (P-value 0.004; CI = .481- 2.231). This means that we can be 95% confident that the true rate lies between .48.1% and .22.31% which shows that there were less variations and at the same time 95% did not vaccinate their birds, and this had a significant effect on production (P-value 0.004). Most farmers (97%) did not deworm their birds although this did not have a significant effect on production (P-value 0.670; CI = .522- 1.967). This means that we can be 95% confident that the true rate lies between .52.2% and .19.67 % which shows that there were strong variations. Most VET services (56%) were provided by NGOs, and this did not have any significant effect on production. The most prevalent poultry disease (38%) was New castle although it did not significantly affect poultry production. The biggest general challenge under poultry disease management by farmers (40%) was limited access to poultry vaccines and drugs. However, it did not have a significant effect on production.

Findings that NCD did not significantly affect poultry production (p-value 0.850) raises objections since from literature consulted NCD is capable of wiping out poultry populations by 80% (Awuni, 2004) and 70%-80% (Chabeuf, 1990; Gueye, 2002) since it affects birds of all ages. This is why the researcher agrees with findings on significance for vaccination (p-value 0.004) because it is the only way to control NCD and sustain good production on the smallholder poultry farm. Inadequate access to veterinary services was sighted as a major constraining factor

to disease prevention, treatment and management let alone challenges associated with the scavenging system itself. A majority of rural poultry farmers have poor access to veterinary services so hence remain either unaware of benefits of disease control or unable to access vaccines and drugs therefore leave their bird flock to risky high mortality rates.

Findings that a majority of famers supplemented feeding for their birds and this significantly influenced production (P-value 0.003) are well taken by the researcher because they support earlier work by Roberts (2012) *on utilization of poultry feed resources* in which it was reported that supplementary feeds especially rich in proteins increases growth and survival of chicks and growers thereby sustainably contributes to increases in poultry production.

Overall, critical findings for support of poultry livelihoods in the rural study area of Pajule sub county surround these strongly significant issues namely; the promotion of free range system, the multiplication of local chicken while paying more attention to feed supplementation with more deliberate provision of feedstuff away from the ground and the giving of more attention to increasing access to poultry vaccines and poultry drugs.

4.2 Social Economic Contributions of Smallholder Poultry Production

Table 2 below presents findings on social economic issues surrounding smallholder poultry production in the rural study area. It contains findings on different social economic issues of poultry rearing at household level, variables therein, frequencies as respondents gave information, further analysis of respondent frequencies in percentages and final analysis showing statistical significance of data using p – values. Detailed descriptions are below the table.

Table 2: Social economic contributions of poultry production

Category	Variables	Frequency	%age	P-value	95% Confidence Interval	
					Lower	Upper
Poultry care	Husband	30	8.1	0.528	.222	1.229
	Wife	294	79.2			
	Children	47	12.7			
Decision taking roles	Husband	317	85.7	0.000	.558	1.657
	Wife	48	13.0			
	Children	5	1.3			
Wealth creation using poultry	Acquire animals	109	32	0.788	.159	.865
	Acquire household assets	47	14			
	Buy agricultural inputs	27	8			
	Pay for education	92	27			
	Pay for medical bills	22	6			
	Personal needs	16	5			
	Nothing acquired	3	1			
	Depend on relatives	27	8			
	Education level of respondents	Non formal	102			
Primary		223	59			
Secondary		45	12			
Tertiary		7	2			
None monetary benefits of poultry	Source of food	341	43	0.440	.422	.610
	For hospitality	219	28			
	Manure of crops	40	5			
	Cultural purposes	186	24			

Activities that supplement poultry production	Farming	386	39	0.000	.541	.638
	Petty trading	74	8			
	Charcoal burning	156	16			
	/Firewood production					
	Brick laying	127	13			
	VSLA(group savings)	44	4			
	Sale of animals	77	8			
	Casual labor	87	9			
	Formal employment	12	1			
	Informal labor	17	2			
Depend on relatives	4	0				
Alternative income sources	Boda boda riding	15	4	0.016	.751	2.301
	Sell shop/trading	46	12			
	General farm produce	314	83			
	Formal employment	5	1			

Poultry was mostly under the care of the wife (76.2%), although this did not have any significant effect on production. The researcher agrees with this finding because it is as also mentioned by other scholars (FAO; 1998, Bravo-Bauman; 2000 and Mathius; 2006) to be the practice everywhere in the world. Study findings also revealed that most decisions on poultry keeping were taken by husbands (85.7%) and this significantly influenced poultry production (p-value 0.000; CI = .558 – .657). This means that we can be 95% confident that the true rate lies between .55.8% and .65.7 % which shows that there were less variations. This is true because as supported by literature, (Sonaiya and Swan 2004) men hold stake in ownership of these birds and come in to assist mostly when the stork involved is larger and the production is commercial in extent. It looks paradox in that whereas women took care giving role they as also reported (FAO;

1998, Gueye; 2003a) actually do not wield decision making power regarding the use of proceeds from poultry sales at household level. The study also found that most farmers (32%) acquired animals from poultry keeping but it did not have a significant effect on poultry keeping. This is purely because macro livestock rearing and poultry rearing are two different enterprises that are not necessarily complementary to each other. However, acquisition of macro livestock using proceeds from poultry is a step in wealth creation (Besbes, 2009).

Results further revealed that most respondents (59%) had completed primary education and this had a significant influence on production (p-value 0.000; CI = .237– 955). This means that we can be 95% confident that the true rate lies between .23.7% - .95.5% which shows that there were strong variations. FAO; 2010, report on the same low literacy rates among farmers lamented the negative impact of low literacy on record keeping amongst smallholder farmers let alone negative impacts on knowledge transfer and adoption. Since this significantly affected poultry production in the rural study area, care must be taken by extension service providers and agricultural research agents while handling farmers if desired output of their work is to be realized. It was further established that most farmers (43%) used the birds as a source of food although this did not have a significant effect on production. The food in terms of poultry meat and eggs according to (Abera *et al*, 2012) is a contribution of about 90% of the total rural population consumption of proteins. The researcher in this study also agrees because it is not common to site a butchery in the rural places and in addition (FAO; 2013) advised that it is valuable to the household members themselves. The study also found that farming (39%) was the highest activity that supplemented poultry production, and this significantly influenced smallholder poultry production (p-value 0.000) which explains why trading in general farm produce (83%) was recorded as the most common alternative income source, although it did not have a significant effect on poultry production (0.016).

Critical social economic matters that significantly influence smallholder poultry production in the rural study area of Pajule Sub county were namely; decision taking roles on what to do with poultry products where men take the lead, education level of respondents considering that a majority are primary school drop outs, and the supplementation of poultry production with other farming activities. The above important study findings on social economic matters that significantly affected smallholder poultry production should be taken very seriously during

promotion of poultry production in rural area in Pader district and elsewhere in Northern Uganda.

4.3 Major Challenges faced by Smallholder Poultry Farmers.

Findings showed that critical constraints of smallholder poultry systems were partly due to poor management practices.

All the challenges related to poor management practices were categorized into four i.e. losses due to predation, losses due to accidents, inadequate feed supplementation, and inadequate housing. There was omission on poultry health related challenges having captured that in details while discussing poultry management system and practices in section 4.1.

Further analysis of these challenges is shown on table 3 below.

Table 3: General challenges affecting poultry production.

Category	Variable	Frequency	%age	P-value	95% Confidence Interval	
					Lower	Upper
Challenges	Predation	293	50	0.086	.783	.300
	Accidents	49	8			
	Lack feeds	138	24			
	Lack housing	103	18			

Study findings on table 3 above show that predation amongst the four challenges proved to be the most constraining to smallholder poultry farming. It pulled 50 % of the overall constraints that affected poultry production. However, its significance to poultry production in terms of poultry numbers and productivity was relative (P-value 0.086; CI = .783 – .300). This means that we can be 95% confident that the true rate lies between .78.3 % - .30.0% which shows that there were strong variations. This is probably because predation largely depends on suitability of

environment to predators such as kites, eagles and wild cats and wild dogs. On the other hand, even errant domestic dogs and some humans (thieves) are normally treated as predators. The explanation of predators as narrated by study respondents, included thieves (that is human) and animals that ranged from domestic roaming dogs and cats to wild animals hailing from nearby bushes and bigger predator birds such as eagles and kites and reptiles such as snake and monitor lizard. Roaming domestic dogs often prey on eggs. Study respondents further explained that eagles were able to carry both chicks and adult birds while kites preyed on young chicks. Problems of predation were partly explained from the point of inadequate housing shelters for birds in the study area.

It was notable to find that households whose homesteads were near major roads, feeder roads and village roads often faced challenge of their poultry stock getting involved in road accidents. Further probe proved that the accidents on birds on major trading centers were caused mainly by speeding vehicles while those on village roads and feeder roads were mainly caused by motor cycles (boda boda). The statistic on birds getting knocked in accidents stood at 8%. A handful of respondents were also able to mention accidents caused by heavy night rain storms for those that lacked night accommodation for birds and others by playing young children who sometimes stone birds to kill.

Respondents who perceived lack of housing as a challenge were few actually 18% which is contrary to the earlier finding on management practice where it was found that 65% leave their poultry to perch on houses and trees. This contradiction may be because the smallholders find perching outside housing as normal practice and hence not obliged to mention and perceive it as a challenge. Reviewed literature actually shows how some smallholder famers cope up with this problem by sharing accommodation with birds (Ahlers *et al*; 2009), offering night accommodation in the kitchen (Hunduma *et al*; 2010) and even with family members in the famers main house (Muchadeyi *et al*; 2004)

Up to 24% of respondents agreed facing challenges faced in terms of difficulty in provision of feeds to supplement what birds obtain on their own while scavenging. Some respondents however were quick to explain that, the weight of this problem actually varied according to agricultural season for crop harvests by farmers. The researcher concludes that seriousness of

this challenge is actually relative since earlier analysis of respondents who agreed not to supplement the feeding of their birds stood at only 14% (see table 1).

A handful of respondents also cited other problems that were all too small to tabulate. These related to challenges in gaining access of reliable profitable market for live birds and poultry products, price fluctuations in the market, squabbles with neighbors over poultry eating drying and flowering crop produce, and lack of reliable sources of quality stock for breeding. Challenges related to disease prevention and treatments were discussed in the earlier sections where NCD proved to be the most devastating disease and inadequate access to veterinary services.

In summary major constraints to rural poultry production were found to include; poor housing of domestic birds, inadequate knowledge on poultry production, poor health, predators, seasonal availability of supplementary feeds, lack of planned breeding, poverty, and poor marketing structures for poultry and poultry products. These were further classified as constraints related to management, institutional gaps and socio economic constraints. The benefits of rural poultry production to a smallholder farmer and the local economy can only get maximized by addressing these constraints.

4.4 Impact of farmers' management practices on poultry productivity.

The analysis directly looked at production parameters of egg production and average population of live birds at household level and related these to food availability during the agricultural seasons of a year. The analysis and research findings are split in 2 tables i.e. table 4 (a) and table 4(b) here below.

Table 4 (a): Impact of poultry management practices on productivity of eggs and poultry numbers

Category	Variable	Frequency	%age	P – value	95% confidence interval	
					Lower	Upper
Egg clutch size	< 5	0	0	0.002	.523	1.667
	6– 10	36	10			
	>10	314	87			
	No response	10	3			
Frequency of egg lay per hen per year	Once	85	24	0.282	.158	.762
	TWICE	178	49			
	>Twice	92	26			
	None response	5	1			
Highest egg production season	February – May	48	13	0.000	.337	.545
		174	48			
	June – September	136	38			
	October – January	2	1			
Average bird population per species per household	Local chicken			0.869	.122	.910
	Exotic chicken					
	Geese					
	Ducks					
	Turkeys					
	Pigeons					

It was established that most poultry farmers had egg clutch size above 10 (87%) and this had strong significant effect on poultry production (p-value 0.002; CI = .523 – .667) the strongly determining factor for increase production on poultry farms is egg clutch size while bird population remains less significant. Having realized the strong significant effect of egg clutch sizes above 10 for sustainable increase in poultry production, it remains important that the smallholder poultry farmer promotes practices that promote large egg clutch sizes and good

quality of eggs with high hatchability. These practices include; adequate fresh good quality feeds for nutrition coupled with fresh clean drinking water (Jacob *et al*; 2011), and provision of a balanced diet (Harry *et al*; 2007).

Most hens laid twice (49%) and this did not have a significant effect on poultry production (p-value 0.282; CI = .518 – .762). This means that we can be 95% confident that the true rate lies between .51.8 % - .76.2 % which shows that there were less variations. The researcher agrees with this finding since according to (Moges *et al*; 2010) significant levels are for hens that can lay more than twice and actually four times in a year. The season of June-September recorded the highest egg production and equally had a significant effect on production at the farm (p-value 0.000), therefore it mean that any chicken multiplication program for the rural smallholder farmers of the study area should target supply of hens and pullets around the season of June - September which normally coincides with abundant forage and beginning to the peak of harvest of grains like millet and maize.

Table 4(b); Showing average bird population per household.

Number of households keeping different bird species								
S/n	Category	Households owning	Total number of birds	Average birds per household	% age	P – value	95% confidence interval	
							Lower	Upper
1	Local chicken	360	85,533	24	96	0.869	.687	2.746
2	Exotic chicken	5		0	1	0.13	.653	4.256
3	Geese	0	0	0	0	-	.351	2.529
4	Ducks	3	598	14	1	0.523	.245	3.205
5	Turkeys	3	160	18	1	0.458	.281	2.231
6	Pigeon	5	865	17	1	0.771	.404	1.241
	Total	376			100 %			

On average, 96% of the birds were local chicken although this did not significantly influence production (P-value 0.869; CI = .687 – 2.746), 1% were exotic (P-value 0.13; CI = .653 – 4.256),

Ducks (1%) (P-value 0.523; CI = .245 – 3.205), Turkeys (1%), (P-value 0.458; CI = .281 – 2.231) and pigeon (1%) (P-value 0.771; CI = .404 – 1.241). Results show that the average bird population did not affect production. Therefore, basing on the findings of significance level between egg clutch sizes (p-values 0.002 CI = .523 – 1.667) and chicken bird populations (p-values 0.869; CI = .687 - 2.746) the strongly determining factor for increase production on poultry farms is egg clutch size while bird population remains less significant. The average bird population per household for each species did not exceed 24 and was 24 for local chicken species. The researcher agrees with findings of (Bourzart & Saunders; 1989) which mentioned that family flock size of 5-20 birds as a limit beyond which challenges of family labour, feed and malnutrition remain under control.

CHAPTER FIVE:

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter provides the summary of key findings from the study on Characterization of the poultry industry amongst smallholder farmers of Pader District. The findings cover four areas of study i.e. management practices with respect to housing/shelter, feeding/nutrition and health, the social economic contributions, and challenges facing the smallholder poultry system and impact of farmer practices on production numbers of eggs and live birds. This is a presentation of the summary of findings, the conclusions arrived at from several discussions of findings and recommendations for improvement of the smallholder poultry management system.

5.1 Summary of Findings

The findings from the study showed that 98% of smallholder poultry are indigenous chicken managed under free range system with a majority of poultry owning households (97%) mainly rearing indigenous chicken. However, the number of birds was significantly low (less than fifty) for most of the poultry rearing households. The indigenous chickens are a favorite because of several reasons but prominently due to their versatility as birds that are easy to keep as they easily multiply since they are tolerant to harsh conditions besides being tolerant to diseases and also easy to convert to quick income. Critical findings for support of poultry livelihoods in the rural study area surround these strongly significant issues namely; the promotion of free range system, the multiplication of local chicken while paying more attention to feed supplementation with more deliberate provision of feedstuff away from the ground and the giving of more attention to increasing access to poultry vaccines and poultry drugs. Critical social economic matters that significantly influence poultry production in the rural study area were namely; Poultry was mostly under the care of the wife (76.2%), men wielding decision taking roles on what to do with poultry products, education level of respondents considering that a majority are primary school drops (59%), and the supplementation of poultry production with other farming activities should be taken very seriously during promotion of poultry production in rural area. Many challenges affecting rural smallholder of which the greatest was predation and others included; inadequate poultry housing, low literacy rates amongst poultry farmers (59% attained

primary education level), accidents on road and at home caused by moving vehicles, motorcycles, mischievous neighbors and harsh climatic conditions. Limited access to veterinary services (94% famers lacked access) such that NCD posed serious threat under limited vaccination (93% famers experienced it), seasonal availability of supplementary feeds, lack of planned breeding, and poor marketing structures for poultry and poultry products. These were further classified as constraints related to management, institutional gaps and socio economic constraints. The benefits of rural poultry production can only get maximized by addressing these challenges. Basing on the findings of significance level between egg clutch sizes (p-values 0.002) and bird populations (p-values 0.869) the strongly determining factor for increase production on poultry farms is egg clutch size while bird population remains less significant since a majority of hens produced egg clutch size above 10 (87%). The season of June-September recorded the highest egg production and equally had a significant effect on poultry production (p-value 0.000). Findings showed many social economic benefits of poultry production amongst smallholder farmers that included food for home consumption, pay for cultural and social obligations and other hospitality. However, the most moving was the fact that most farmers (32%) acquired animals from poultry keeping as a step forward in poverty alleviation thereby leading to wealth creation at household level.

5.2 Conclusions

The study attempted to characterize the poultry production system amongst smallholder farmers in Pader District. This was in relation to the significant roles that poultry farming plays in the lives of smallholder farmer households and the community in general.

The study specifically sought to identify poultry management practices employed by poultry farmers and these were found;

The smallholder poultry was basically practiced on free range system with several interactions between species, ages of poultry and domestic animals, and wild birds, poultry from different neighborhood households, and even with wild animals as they scavenge about and that dominant species found being the indigenous chicken.

Much care was provided to supplement poultry feeds but they often threw feeds on the ground.

Famers gave little care to provision of birds housing for shelter.

Famers gave little care to provision of general health care by routinely deworming, vaccination, and treatment of diseases.

Therefore, the smallholder poultry production system ails with heavy burden of mortality of chicks and adult birds due to predation, accidents and diseases and exposure to hash weather many of which could be prevented through provision of birds housing and preventive health management.

The study assessed the social economic contributions of poultry production and found it contributes a lot to the economic and social wellbeing of smallholder households and the community at large in ways both small and big but all very important in reducing vulnerability hence stabilizing them against hunger, poverty and even steps in wealth creation. The contributions can be rated in the form of cash incomes and nonmonetary contributions they were;

The smallholder poultry production provides employment majorly to women and children while men come in to carry out sales and take major decisions regarding the enterprise.

The education level of respondents was found to have a majority being primary school drop outs,

The assessment established that most farmers (43%) used the birds as a source of food.

The majority of smallholder poultry famers supplemented poultry production with other farming activities.

Most farmers (32%) acquired animals from poultry keeping which is a step in wealth creation at household level.

The study established major challenges faced by smallholder poultry farmers and these were majorly management related and to a lesser extent institutional related.

The major management challenge was predation due to limited provision of housing for poultry shelter.

The major institutional constraints was limited access to veterinary services that includes poultry vaccines and drugs.

Other constraints included seasonal availability of supplementary feeds, lack of planned breeding, poverty, and poor marketing structures for poultry and poultry products.

Analysis of Impact of farmers' management practices on poultry production concluded that;

It was established that most poultry farmers had egg clutch size above 10 eggs. Therefore, the strongly determining factor for increase production on poultry farms is egg clutch size.

The season of June-September recorded the highest egg production and strongly had a significant effect on production at the farm.

Improvement of management practices employed by the smallholder poultry farmers while addressing institutional challenges that impact on their poultry production system is needed so as to enable the smallholder farmers increase benefits from their poultry production while also increasing their local economic contribution to development of their rural area.

5.3 Recommendations

Many constraints affect the efficiency of production system for smallholder rural poultry. If these are to be addressed in a way of maximizing the benefits of poultry to the owning households and the community at large, the strategies for improvement should start with improvement of management practices then followed by improvement of institutional services followed by organized linkages to better markets.

Efforts are needed to build capacity of rural poultry farmers in disease identification, prevention and management. Much as some farmers know and practice some indigenous ways of disease prevention and treatment, there is need to document and promote known indigenous knowledge because these help first hand before a farmer seeks to access services of a qualified veterinarian.

The current limited vaccination programme by government perhaps require mobilization of local contributions so that farmers contribute partly for development of expanded vaccination programme to their benefits. Government on the other hand, needs to increase presence of public

extension service providers as mandated by the Constitution and the Local Government Act (CAP.243) through recruitment, equipping and deployment in the field to improve access of the much needed veterinary services. Because these are decentralized services which must be provided and are not limited to poultry famers alone. There is need to rally the private sector to rollout affordable veterinary services to the smallholder poultry famers on the basis that famers will be able to demand and pay on realization of desired poultry production output.

Improvement of farmer knowledge is possible through T.O.T (training of trainers) and subsequent support of T.O.T's to provide community poultry health services to bridge the glaring gaps in access to information and knowledge.

Farmers must know the advantages of housing /shelter to the birds of all ages especially in reducing chances of predation and losses associated with adverse weather and vulnerability of chicks and brooding mother hens. It is their role to provide accommodation to their stock.

Careful farmer participation in competitions where rewards are provided to motivate poultry farmers who attempt to house their birds and manage to attain efficiencies in production would go a long way to motivate and increase the adoption of bird housing practices. These could be championed by political leadership together with the private sector agencies involved in livelihood promotional activities in the community.

Through the microfinance rural finance centers, Institutional arrangements to provide cheap microfinance for poultry production as a business can go a long way in helping farmers capitalize their rural poultry enterprises. These could take forms in which farmers come into groups to provide guarantee to members and negotiate longer and better repayment terms.

Since women were found to take lead in poultry care, whereas men were active in decision making roles, ongoing policy developers should factor careful considerations of gender relations that must be taken into consideration to empower women when implementing any future poultry stocking programme. Women can lead in technology transfer models involving poultry production at community level.

Having realized the way a majority of poultry farmers acquired livestock using proceeds from poultry enterprise the government extension workers should encourage beneficiaries of government programs like OWC to choose poultry for poverty alleviation.

5.4 Suggestions for future Research

Having given the above recommendations on poultry production in the rural area under this study, below are my suggestions for further research;

Ethno veterinary knowledge and practices amongst smallholder poultry farmers.

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APPENDICES

Appendix I: Data collection tool

DATA COLLECTION TOOL FOR CHARACTERISATION OF SMALLHOLDER POULTRY PRODUCTION AND SOCIOECONOMIC IMPACT ON THE LIVELIHOODS OF THE SMALL HOLDER FARMERS IN PADER DISTRICT

Introduction;

The researcher is a student of Uganda Martyrs University carrying out research on characterization of poultry production in your area.

This questionnaire is therefore intended to collect your views, attitude, and practices of poultry production and the information you give will be used strictly for purposes of this research and nothing else.

The researcher will not record your name or any personal details particular to this research so feel free to contribute as honestly as possible.

Questionnaire identification;

Sub-county.....Parish.....

Village..... Date of data collection.....

Back ground information

1.1 Sex of the respondent

Male Female

1.2 Age of the respondent

Below 25 years 26-35 years 36-45 years 46 years and above

1.3 Marital status of the respondent

Single Married Divorced

1.4 Level of education attained.

No formal education Primary U.C.E Tertiary

1.5 House hold type

Child headed Female headed man headed

1.6 Number of members in the house hold

1-2 3-6 7 and above

1.7 Please list at least three sources that the family depends on for a living. 1.....2.....3.....

2 Poultry management system

2.1. Poultry information

2.1.1a. Please tick from the provided list all the type of poultry kept by your house hold

a) Chicken i) local /ii) exotic b) Ducks c) Geese d) Turkey e)
Pigeons

2.1.1b. From the answer you gave above, what is your favorite poultry and give one reason.
favorite.....reason.....

2.1.2. How many chicks / pullets /cocks do you have?

Bird specie	Chicks	Pullets	Hens	Cocks	Total
1.Chicken					
2.Ducks					
3.Turkeys					
4.Pigeions					
5.Guinea fowls					

2.1.3 With reference to your favorite poultry, how many times do they lay in a year?

Twice Thrice More than thrice

2.1.4 What is the average number of eggs produced per clutch per bird?

a) 1 – 5 b) 6 – 10 c) Greater than 10 i.e. > 10

2.1.5. From your experience what is the highest egg production period in a year?

February - May June - September October –January

2.1.6 From your experience what is the least egg production period in a year?

February - May June – September October - January

2.2. Type of poultry management

2.2.0. What type of poultry management system do you practice?

a) Free range b) Fold unit c) Deep litter c) Run system

2.2.1. Nutrition/feeding

2.2.1. Are your poultry given supplementary feeding?

1. Yes 2.No

2.2.2 If yes, what is the source of your supplementary feeds? Please tick.

Home saved grains human food remains formulated feeds

2.2.3. How is the feed provided? Please tick.

1. Put feeds in containers 2.Feed thrown on the grounds

2.2.4. Are your poultry provided with water?

1. Yes 2. No

2.3. Housing/night shelter

2.3.1. Please specify by tick the types of shelter under use for your poultry.

- In the kitchen

- Perch on the tree/house
- Built poultry house

2.4. Disease control

2.4.1 Please mention the most disease that affects your poultry in the last one year.

.....

2.4.2. Please mention your most practiced option for control of poultry diseases.

- Vaccination
- Treatment
- De worming

2.4.3 If you vaccinate your poultry how often do you carry out vaccination in a year?

Once Twice More than twice

2.4.4. If you carry out treatment and de worming of your poultry where do you obtain your drugs?

- Veterinary Department
- Animal drug shop
- Community trained workers
- Outside the district

2.4.5. Please mention whether you ever received any support for poultry production from NGO and government in the recent year? 1) Yes 2) No

2.4.6. If yes mention the kind of support, support.....

.....

2.4.7 Please mention any two challenges you face in control of diseases among your poultry.

1.....

2.....

2.5.0 Socio-economic matters.

2.5.1. Please mention who among these household members takes care of the poultry most of the time.

Husband

Wife

Children

2.5.2 Please mention who amongst family members takes the lead in decision making regarding the use or sale of poultry products.

Husband

Wife

Children

2.5.3 Other than poultry production, what is the alternative source of income for your household?

Boda boda Sale of a shop General farm products formal employment

2.5.4. If possible please mention and show me only one asset that you acquired with the help of poultry sales or any one problem that you solved in the last six months,

.....
.....
.....

2.5.5. Please mention any future plans for advancement of your poultry production and how you plan to get resources for fulfillment of your future plans

.....
.....

2.2.6. Please mention some of the uses of domestic birds you keep different from money needs.

.....
.....
.....

3.0 Challenges.

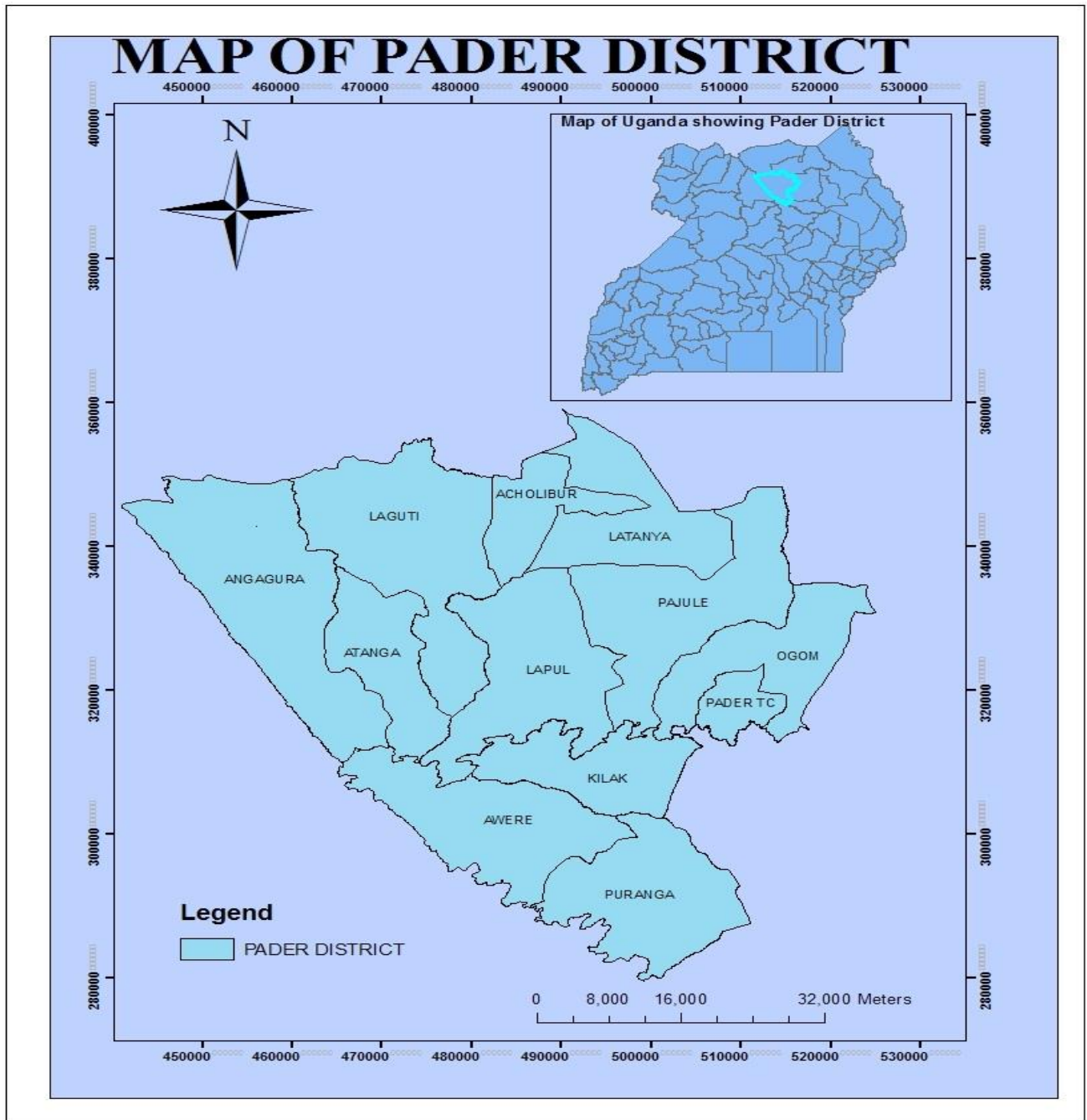
3.1.0 Please list all the challenges faced by the household in the process of rearing poultry that you may not have mentioned above

.....

.....
.....
3.1.1 Given the mentioned challenges can you propose any ways forward for tackling these challenges while allocating the Centre of responsible action

.....
.....
.....

Appendix II: The map of Pader district, Northern Uganda



Appendix III: A boy providing supplementary feeds to the household birds



Appendix IV: Krejcie and Morgans (1970) sampling tools.

TABLE I
Table for Determining Sample Size from a Given Population

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size.
S is sample size.