ESTIMATION OF CONSUMER PREFERENCES FOR COWPEA VARIETIES IN KUMI AND SOROTI DISTRICTS, UGANDA

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DECLARATION AND APPROVAL

Declaration

I hereby declare that this thesis is my original work and effort and has not been presented in this or any other University for any award. Information from other sources has been duly acknowledged.

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This thesis has been submitted with my approval as supervisor.

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DEDICATION

To my beloved wife, Tumwesige Pauline, my children, Angel, Grace, Edgar and Edmond-Thanks for being there for me.

To my beloved mother Candiru Edisa, who out of the ordinary brought up eight children with income from subsistence agriculture.

And to the children and communities in the Northern and Eastern part of Uganda, who treasure and derive their livelihood from Cowpeas.

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ABSTRACT

Cowpea (*Vigna Unguiculata L. Walp*) is one of the most important indigenous legumes of the tropics and sub tropics. In Africa information on cowpea marketing and trade is lacking and data on cowpea production and consumption economics scattered, yet the urban population in developing world are undergoing a nutritional transition characterized by decline in consumption of traditional food crops, and increasing consumption of refined and processed foods, fats, sugars, and animal foods. There is need for a shift in philosophy of "here's what we produce" to a situation where farmers take note of food products the consumer wants in order for their products to have a place in the market.

This study focused on consumer preference for cowpea in Soroti and Kumi district, as these produce 90% of Uganda's cowpea crop. Using structured questionnaire 161 households were reached and 4 focus group discussions held in Soroti and Kumi. Hedonic price model was used to estimate preference for attributes.

Study results showed that cowpeas are important part of diet as is consumed by up to 99.4% of the households and served on important occasions (73%) like funerals, child naming and to visitors, (71%). This popularity, and extensive current consumption, could translate in to a good market potential for the crop, if tapped well. It's more cherished by women (65.84%) and is consumed by over 90% of all the age groups. However, less and less parents teach their children how to prepare the crop, this being a potential danger of extinction of the crop in the future.

Consumers have preference for white and tan testa cowpea and large seeded crop, associated with *Ebalat*, *SECOW 2W* and *Icirikukwai*. Results show that seed color (56%) and seed size are the most important quality parameters consumers consider in their decision to purchase. Consumers are willing to pay a premium for white grain color, the coefficients for all the other 4 varieties except *Kenyan* being positive and statistically significant. The Ugandan consumers discounted the black seeded cowpeas. These results suggest that efforts to improve upon grain size and the white testa color will be worthwhile in Uganda as consumers seem to be more interested in large seeds and white testa. Consumers are willing to pay more for a pure product and therefore it is recommended that traders and producers sort their seeds before sale. Awareness creation campaigns on nutritional importance of cowpeas and a study in regional preference and demand are recommended.

CHAPTER ONE

INTRODUCTION

1.0 Background

African economies are increasingly confronted with changing food and commodity markets, due to globalization, economic liberalization and urbanization. Subsequently, consumer preferences change. This poses new opportunities but also challenges to small-scale producers, traders and processors along agricultural value chains. In recent years, the international debate has refocused some attention to agricultural and rural development, particularly in Africa. There is broad consensus that for instance the Millennium Development goals can only be reached if the rural population's economic status is lifted. Rural economic development involves the transformation of agricultural based economies into more urban-industrial and service-based economies. This can be achieved through ensuring their active participation in the value chain and producing what the market demands (Hoeffler, 2006).

1.1 Uganda's Economy

Although the contribution of the agricultural sector to total GDP has continued to decline over the years, it still remains pre-dominant in the economy of Uganda. It contributed about 21 percent of the total GDP in 2007. The sector also provides approximately 70 percent of the employment and most industries and services in the country are dependent on this sector (UBOS, 2008). Agriculture is still the most important sector of Uganda's economy, as according to 2002 census 79% of households are engaged in agriculture.

While development efforts in terms of policy and priority was focused on traditional crops, like cotton, coffee, tobacco; there is a reverse trend where non traditional crops have attracted attention of policy makers and researchers in Africa specifically in Uganda, more so due to decline in world trade and falling commodity prices. According to 2009/2010 Uganda Government National Budget Frame work, although the growth of Uganda's exports remained strong in the first half of FY2008/09 compared to the same period a year ago (14% increase), the terms of trade, which reflects the relative price of exports to import prices, worsened as global demand and prices for coffee and cotton declined. For example, by December 2008, world coffee and cotton prices had fallen by about 25% from a peak in February 2008. However, within the region, demand for Uganda's goods and services remained strong more so in the non traditional export crops that among others include flowers, fish and food items like pulses/legumes, banana's as well as cereals. This provides an excellent opportunity for the country to mitigate the effect of falling global demand for traditional exports.

The Agricultural sector still faces challenges that relate to uncoordinated interventions which have resulted into ineffective and inefficient use of resources. This is compounded by lack of reliable agricultural statistics for effective planning and monitoring besides the derisory markets for the products and lack of a clear framework for regulation and quality assurance. Under Poverty Eradication Action Plan-Government's framework paper, under the agricultural sector, the priorities are to improve production and marketing under PMA in order to harness the regional export market, where cowpeas are already making impact.

1.2 World Production

Cowpea (*Vigna Unguiculata L. Walp*) is one of the most important indigenous legumes of the tropics and sub tropics (NRC, 2006). An estimated 7.6 million tons of cowpea is produced annually worldwide, estimated to be on about 12.8 million hectares of land of which about 64% is in Africa, 21% in the America's and the rest in Europe and Asia. Nigeria is the largest cowpea producer accounting for about 22% of the total, followed by Brazil which produces 10% on 1.144 million hectares of land annually (Pereira, *et al.*, 2001). In the United states during the 1990's, about 21,000 ha of cowpea were grown annually for commercial dry grain production, mainly in California and Texas, with about 41,000tons of dry grain produced annually (Hall *et al.*, 1996). About 11,000 ha of cowpea were grown ber year for frozen and canned southern peas, mainly in the south eastern U.S., and about 30,000 ha of cowpea grown in home gardens mainly for fresh southern peas, but with some dry grain production.

In Africa information on cow pea marketing and trade is lacking and data on cowpea production and consumption economics not readily available. In part this is because marketing research has focused on export crops such as cocoa, coffee, cotton, and groundnut, and to a lesser extent cereals (Van der Laan, 1999). The main use of cow pea as a vegetable crop is as a legume, especially for small scale farmers in rural areas. It is very palatable, highly nutritious and relatively free of metabolites or other toxins and provides an inexpensive source of protein in their diet (Aveling, 2000)

Virtually, every developing country has a chronic protein deficiency. According to Mellor, (1990), Morley and Hermione (1994), there are increasing cases of malnutrition and many deaths of infants have been attributed to it. It is thus necessary to suggest, that increasing consumption of foods rich in proteins is needed (Emaju, 2000). Cowpea constitutes sub Saharan Africa's most widely planted native legumes. At the present, it is the second most important grain legume continent wide (NRC, 2006).

Beyond its nutritional value, cowpea has a high potential for rural development. Because of combination of benefits cowpeas offer, it is perhaps the most vital of all Africa's native vegetables. It seems thus likely that it has the best potential for boosting the nutrition in African (NRC, 2006).

1.3 Cowpeas Production in Uganda

Cow pea is a short season crop which grows in two seasons during the year as practiced in cowpea growing areas in Uganda. How ever, 90% of the crop is grown in the second rains which normally lie between September and December. This is because the distribution of rainfall often exceeds the optimal requirement of the crop during the early season (March-May). Danger also exists of having insufficient sunlight to secure ripening and drying of the pods of the early crop. Disease and pest prevalence are also high during the first rains (Adipala *et al.*, 1999).

Cowpea grain contains between 20-25 percent protein according to McFarlane (1983) and 64 percent carbohydrate (Bressani, 1985). It therefore has a tremendous potential to contribute to the alleviation of malnutrition. The crop serves to bridge the hunger gap between planting and harvesting periods of main food crops. It is an inexpensive source of protein for both rural and urban consumers. In addition, cowpea contributes to the sustainability of cropping systems and soil fertility improvements in marginal lands by providing ground cover and plant residues, fixing nitrogen and suppressing weeds (Inaizumi *et al.*, 1999). They help to maintain yield of agricultural crops in areas where fertilizers are hard to obtain or are not affordable (Golop *et al.*, 1996). According to Inaizumi *et al.*, (1999) cowpeas also cause suicidal germination of *Striga hermonthica*, which is a devastating, parasitic weed of cereals. Cowpea has been described as an ideal crop for the semi arid regions of the tropics where other food legumes may not perform well (Afolami, 2002).

Cowpeas differ in characteristics depending on the variety. There are usually 8-20 seeds per pod. Seeds vary considerably in size, shape and color. They are relatively large (2-12 mm long) and weigh 5-30 g/100 seeds. Seed shape is correlated with that of the pod. Where individual seeds are separate from adjacent ones during development, they become deformed. But as crowding within the pod increases, the seeds become globular. The testa may be smooth or wrinkled; white, green, off-white, red, brown, black, speckled, blotched, eyed helium white surrounded by a dark ring) or mottled in color.

According to Adipala *et al.*, (1999), choice of variety by a farmer depends on production goal (subsistence, commercial or dual purpose) and locality. The cowpea varieties grown in

the study region include *Icirikukwai* (semi-spreading, indeterminate, white seeded), *Ebelat* (erect, determinate, white seeded) and a black seeded variety called *Kenyan*. Two improved cowpea cultivars were recently introduced (*SECOW 1T* and *SECOW 2 W*) according to reports at Serere agricultural research centre. Traditionally, *Icirikukwai* was grown solely for local consumption of leaves and grain. The *Kenyan* variety was grown solely for sale in Kenya. Local consumers do not consume the leaves or grain produced by this variety because of the higher market value when sold in Kenya. *Ebelat* was grown by subsistence, dual purpose (transition) and commercial farmers. Earlier studies by Adipala *et al.*, (1999), amongst farmers, put market value for *Icirikukwai* being less than for the other varieties (The costs per unit kilogram for *Icirikukwai*, *Ebelat* and *Kenyan* were; 800, 1350 and 2500 Uganda shillings respectively). Explanations for the low market value of *Icirikukwai* from farmer's point of view were that it produced a small seed, took longer to cook and had low yield potential.

Cowpea, though widely grown in Uganda is a crop of the north and east, where it provides an estimated 60% of all the protein diets to the population (Adipala, 1994). These areas are the main sources of cowpea to the rest of the country. Edible forms comprise the green tender shoots and the leaves, unripe whole pods, the green peas and the dry seeds (Aveling, 2000). Dry seeds represent one of the least expensive protein rich foods for both the rural and urban use. Most of the trade in cowpea takes place in grain form. On a limited scale, green shoots are also popular in the markets. In Uganda, cowpea is increasingly becoming an important cash crop (Sabiti *et al*, 1994). Legumes and pulses including, cowpeas have brought for the small holder farmers in eastern Uganda some hope as cash crops, especially for varieties demanded by the export market (NARO/DFID, 2002).

Since the Uganda government policy is to diversify exports and introduce non traditional cash crops, in the economy, cowpea in this regard presents a great economic potential. Cowpea is the third most important legume crop in Uganda and is grown in all regions of Uganda more so in the drier districts. It is most common in the Northern and Eastern regions, specifically in the districts of Arua, Nebbi, Lira, Soroti, Kumi, Pallisa and Tororo (Sabiti *et al.*, 1994). For many farmers in eastern Uganda where nearly 90% of the countries crop is produced Adipala *et al.*, (1997), it has become a major cash crop with the demise of cotton as the main cash crop and the emergence of important external markets (Sabiti *et al.*, 1994).

As production and consumption do not occur simultaneously, producers and traders need efficient storage and transportation systems to ensure timeliness of cowpea availability for consumers. Consumers, on other hand, want to buy cowpeas at the cheapest price without compromising quality characteristics such as texture of the skin, color of eye and ease of cooking. Production, marketing and consumption are, therefore, inseparably linked (Langyintuo *et al.*, 2002)

1.4 Market Performance of Cowpeas

Marketing is a prime mover and stimulator of production. The marketing system is a major tool of integrating the farming community into the market economy. It links various rural areas as well as rural and urban areas with a network for communication and exchange, which forms the basis for co-ordination of social and economic activities. The provision of secured market outlets gives the incentive to increase output and to diversify subsistence production into commercial farming. Marketing also provides for the transfer of preferences and pressures, (through the price system), from consumers to producers, thus supporting further quality improvement, diversification and specialization in agriculture (Bibangambah, 2002).

1.5 Research

Cowpea is an important food crop in many parts of the semi arid tropics (Jackai *et al.*, 1985). In eastern Uganda, where nearly 90% of the country's crop is produced Adipala *et al.*, (1997), cowpea production is in transition. It was traditionally grown almost exclusively as a food crop for domestic consumption; however, with the demise of cotton as the main cash crop and the emergence of important external markets, many farmers in the region since grow cowpea for cash markets (Sabiti *et al.*, 1994). Amidst this transition, most research in Uganda has focused mainly on production, Adipala *et al.*, (1997), pest and diseases complex (Sabiti *et al.*, 1994; Adipala *et al.*, 1997; Omongo *et al.*, 1997; Omongo *et al.*, 1998). There are only handfuls of research efforts focusing on the demand side of cowpeas more so on consumer preference, for example Adipala *et al.*, (1997) which brought out aspects of producer preference for varieties.

However, in recent years, there is evidence that the 'nutrition transition' has reached developing countries, particularly the urban population there (Millstone and Lang, 2003). This transition is characterized by a decline in consumption of traditional food crops, and increasing consumption of refined and processed foods, fats, sugars, and animal foods and sensitivity to quality (Weinberger and Msuya, 2004). The increasing number of informed and affluent consumers has led to elevated demand for high quality food products. This escalating demand for high quality and high status products and a desire for cultural identification have created a growing market for value-added products that carry a strong identification with a particular geographical region or consumer preference. Consumers today are demanding much more than choice – they also want quality, consistency and value. Much of agriculture has therefore to shift from a philosophy of "here's what we produce" to a situation where farmers take note of what the consumer wants (Mylene and Kirsten, 2001). New technology should ensure agricultural and food products do have the characteristics consumers want (Drabenstott, 1995; Boehlje, 2000).

Acceptance and intention to purchase measures like willingness to pay regarding foods as associated with consumption and purchase process can be used as an indirect way of obtaining data to understand consumer behavior. Intrinsic variables such as color, aroma, flavor and texture in food acceptance and choice are very well recognized, several studies have shown that they play an important role in food acceptance, preference, choice and intention to purchase (Iop *et al.*, 2006).

1.6 Problem Statement

Eradication of poverty and hunger still rank high on the Millennium Development Goals (UN., 2005). There is broad consensus that for instance the Millennium Development goals can only be achieved if the rural areas are promoted through appropriate development programmes. Rural economic development involves the transformation of agricultural based economies into more urban industrial and service-based economies through value addition to the agricultural outputs. This changes the flow of resources and the trade of goods, services, knowledge and information whereby globally coordinated and integrated value chains will gain increasing importance (Humphrey, 2005).

In the efforts to eradicate poverty, the Uganda Government came up with PEAP, where modernization of Agriculture is one of the major focuses (PEAP, 2004). Government policy to diversify exports and thus introduction of non traditional cash crops in to the economy, cowpea in this regard presents a great economic potential and so worth promoting.

Cow pea is among the major cash and food crops in Africa, Uganda inclusive given the fact that they mature early on as little as 300mm of rain, there by reducing farmers' exposure to yield risk and serve as important sources of inexpensive protein and income especially for women, urban and rural poor. It is grown and consumed by many rural and urban populations besides becoming a major source of income especially in eastern Uganda for the small holder farmers (Sabiti *et al.*, 1994, and NARO/DFID, 2002). Indeed, the current structure of income and consumption among the African poor, suggest that significant reductions in poverty will hinge in large part on the collective ability of African farmers, Governments and agricultural specialists to stimulate and sustain broad-based agricultural growth with strong focus on improving marketing conditions for the producers (IFPRI, 2006).

Consumer characteristics, behavior and attitudes are ultimate determinants of market conditions (Jhingan, 1979). Consumption and hence demand next to price and income largely depends on food preferences of individuals, thus targeting cow pea research at characteristics that meet consumers' tastes and preferences is important. Farmers will be reluctant to grow varieties that consumers will not buy. Producers and merchants will be more likely to adopt storage and post-harvest handling technologies that improve the characteristics that consumer's value. Consumer tastes and preferences are reflected in the market through price discounts and premiums that consumers pay for visible characteristics (Langyintuo *et al.*, 2002).

However, there is limited information about consumer desired attributes of cowpeas in Uganda; most research done by Adipala *et al.*, (1997)Sabiti *et al.*,(1994) and others focused on production or technology adoption aspects, yet consumers tastes and preferences are ever changing worsened more so in the current globalized and modernizing cultures in developing countries. For producers to be assured of the market for their products under such environment there is important to take care of consumers changing tastes and preferences. (Weinberger and Msuya, 2004). This therefore calls for a shift in philosophy of production on side of farmers and researchers by taking note of what the consumer wants as was also noted by Mylene and Kirsten (2001), hence the need for this study.

1.7 Objective of the Study

To evaluate consumer preference for cowpea varieties and attributes.

1.7.1 Specific Objectives

- 1. To describe the socio-economic characteristics of urban consumers of cowpeas
- 2. Estimate the prices consumers are willing to pay for the given attributes and cowpea varieties
- 3. To determine the consumer preferred cowpea attributes
- 4. Determine the factors that influence willingness to pay for cowpea varieties

1.8 Hypothesis

- Cowpea attributes like, seed size, seed color, color mixes significantly influence consumer's willingness to pay for the different varieties.
- There is no significant difference in consumer preference in terms of prices consumers are willing to offer for all the varieties of cowpeas.
- Socio-economic characteristics of cowpea consumers does influence willingness to pay for cowpea varieties

1.9 Significance of the Study

In recent years, the international debate has refocused some attention to agricultural and rural development, particularly in Africa. There is broad consensus that for instance the Millennium Development goals can only be achieved if the economic conditions of rural population are improved. Rural economic development involves the transformation of agricultural based economies into more urban industrial and service-based economies. Cowpea being an important crop for the poor and the more disadvantaged, promotion of consumption of such a crop can lead to increased demand which can lead to expanded supply (Kirsten and Vink, 2005), thus increased incomes of the rural poor.

Uganda Government's plan to eradicate poverty through agriculture modernization can be realized for the rural poor, when the markets for the farmer's products are defined and certain. This can be achieved through understanding what the consumers want and producing what the market demands. This is being the contribution of this study for cowpeas in eastern Uganda. This will further inform the efforts to modernize agriculture.

Consumer preferences information will be of great value to researchers to help target their efforts to traits and practices that lead to cowpea products having characteristics that consumers demand. The benefit of this new product will be felt directly by producers as they are able to have better market for their products.

The findings of this study will contribute to the understanding of the factors that affect domestic cowpea consumption in Uganda and provide a basis for formulation of appropriate policies and programmes for promotion of local consumption for cowpea.

The findings of this study also will contribute to the existing stock of knowledge on consumer behavior and can serve as a stepping stone for further research.

1.10 Scope of the Study

The study was limited to 161 cowpea consumers, 20 traders in Soroti and Kumi districts focusing on Soroti and Kumi town councils. Two townships of Bukedea (Kumi district) and Serere (Soroti district) were also sampled. Soroti and Kumi districts are located in eastern part of Uganda. It is hoped that this sample is representative of the country given that these districts produce about 90% of the countries cowpea.

The study delved in consumer, attitudes, preference for cowpea varieties, the desired attributes and consumer characteristics.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section presents relevant literature about cowpeas and consumer demand. It presents studies that are related to the study and the theory upon which it is based.

2.1 Markets and Marketing

2.1.1 Markets

Many developing countries rely on one or a few primary agricultural commodities for the bulk of their export earnings, though they remain net importers of food on balance. For these commodity-dependent, low-income, food-deficit economies, the price instability that is characteristic of agricultural commodity markets can have pronounced impacts on employment, income, government revenue, and food security. Current efforts to liberalize trade policies, to the extent that they have increased households' exposure to risk, have arguably exacerbated the problem of price fluctuations for the world's poor (Sarris and Hallam, 2006). The availability of market for cowpea both domestically and regionally according to Adipala *et al.*, (1999) makes it a potential income and food security crop for the rural poor and so the need to understand its consumers, hence defining the market.

From a marketing perspective, a potential market consists of a group of people with similar needs for a particular good or service, sufficient resources to make a purchase, and the willingness and ability to buy. Market is said to exist when ever buyers and sellers of a particular resource or good freely come together leading to a flow of information that creates the opportunity for trade and exchange of resources and goods. Essentially, buyers and sellers need not come together. How ever, it has been observed that most African markets for Agricultural goods involve physical contact between buyers and sellers hence the markets have a clearly defined geographic location. Most Villages have small markets where traders' regularly gather to market their produce. Ferris and Robbins (1999) were able to identify such markets as road side markets, rural markets/village markets, assembly markets and direct selling to traders. These same kinds of market play an important role in cowpea marketing in Uganda (Bibagambah, 2002).

According to Samuelson and Nordhau (1995), the critical characteristic of a market is that it brings buyers and sellers together to set prices and quantities; leading to their definition of a market as a mechanism by which buyers and sellers interact to determine the price and quantity of a good or service.

2.1.2. Cowpea Production and Marketing

Subsistence farmers in the semi-arid and sub humid regions of Africa are the major producers and consumers of cowpeas. These farmers not only grow cowpeas for dry seed for human consumption and fodder for animal feed, but also utilize the leaves and fruits for vegetables. Cowpeas are widely grown in eastern Africa and Southeast Asia primarily as a leafy vegetable. The protein content of the leafy cowpea parts consumed annually in Africa and Asia is equivalent to 5 million tones of dry cowpea seeds representing as much as 30% of the total food legume production in the lowland tropics (Fery, 2002).

Over 2.2million small holder farmers grow the crop on an average2.5ha in Uganda. Simple traditional methods are used. Traditionally, food crop production has been primarily for own subsistence and local market sales with less than 10 percent entering the market for urban consumption (Emaju, 2000). Seasonal supply with associated rise and descent in prices also characterize production. Cowpea prices therefore keep fluctuating through out the year mostly associated with the harvest season.

The marketing of cowpeas like other crops is mainly confined to local markets and farm gate. This is attributed largely to lack of access to urban markets by farmers partly because of the poor road net work and poor modes of transportation. Considerable local trade in cowpea therefore exists. Inter -regional trade in cowpea too exists and it is a profitable crop to produce according to Sabiti (1995) and a lot of the crop finds its way to the Kenyan markets.



Fig. 2.1: Quantities of Cowpeas Produced, Marketed and acreage under Production in Soroti District.

Source: Office of DAO, Soroti



Fig. 2.2: Quantities of cowpeas produced, marketed and acreage under production in Kumi district. Source: Office of DAO, Kumi

As is shown in figures 2.1 and 2.2, the production, acreage and marketed quantities of cow peas have been on the increase in both Kumi and Soroti with a drop in 2006-2007 season due to the flooding as a result of *Elnino* rains, however after this period, there has been dramatic increase in both districts with the corresponding increases in the marketed quantities due to the increasing value attached to the crop. Studies by Adipala *et al.*, (1999), revealed that, commercial producers invest largest land holdings to the crop than subsistence and dual purpose producers.

District production records for both districts revealed that on the average, the commercial producers invest more land under cowpea production (2.4 ha), followed by the dual purpose (0.9 ha), and subsistence category (0.5 ha), which could be explained by the shift towards commercialization of the crop, due to better profit margins. Adipala *et al.*, (1999), also observed that the farmers that could afford to buy pesticides cultivate more land for cowpea production than those who can not afford.

Available land to farmers appeared not to be an issue with regard to size of cowpea fields. However, lack of capital and inadequate labor seemed to be the main factor restricting cultivation of larger acreage (Isubikalu, 1998).

2.1.3 Quality of the Product

Storage plays a significant role in product quality and thus grain prices. However, qualityprice relationships are less significant during the dry season when poor quality product may sell at a higher price than good quality grain at harvest. Prices tend to be positively correlated over time with damage because damage levels increase with grain scarcity (Langyintuo *et al.*, 1999). These dynamic effects of grain damage on price can be analyzed through multivariate approaches like the regression based hedonic price analysis as has been adapted for this study.

2.2 Demand Theory and Consumption

The postulate theory of rationality is customary point of departure in the theory of consumer behavior. Individual consumer behavior explains the level of demand for commodities given the structure of relative prices faced, real income, and a set of individual characteristics such as age, education, professional status, type of household to which consumer belongs and the geographical environment for example rural –urban divide. (Strauss, 1989). The consumer has a choice and so can vary the amounts of the various quantities consumed. This consumer choice is limited by the budget constraint; he or she can vary the amount of money out of the budget that is spent on particular commodity (Nicholson, 2002).

However, acceptance and intention to purchase measures regarding food products are linked to consumption and the purchase process and can be used as an indirect way to obtain data to understand consumers' behavior (Iop *et al.*, 2006). Acceptance and preference measures for long time have been taken into account in consumer's food studies, (Schutz, 1999). Food acceptability, choice and consumption are complex processes influenced by many factors as intrinsic, e.g. color, aroma, flavor, and texture, as well as extrinsic to the product.

2.3 Consumer willingness to pay (WTP)

Willingness to pay (WTP) for a product, is defined as the maximum price that can be charged without reducing the individual's welfare and utilization of the product. Marginal WTP (MWTP) is the WTP for the marginal user (Dossani and Ranganathan, 2003).

Hall *et al.*, (2004) describe the array of techniques available to valuations of the whole set of goods and services provided by agriculture. They outline five possibilities: (1) opinion surveys; (2) the use of proxies to estimate public preferences; (3) consensus methods (focus groups, public juries, interviews, Delphi method); (4) monetary valuation; and (5) multicriteria techniques. Of these techniques, in line with Hall *et al.*, (2004), this study will favor monetary valuation since, unlike the alternatives; this technique relies on the same theoretical axioms as those that underpin consumers' decision processes. Within the range of monetary valuation techniques some alternatives are available for assessing consumer preference for agricultural product namely, the contingent valuation (CV) and the choice experiment , in line with Pattanayak *et al.*, (2006) this study favors CV for its ability in identification of heterogeneity in consumer behavior and segments in agribusiness studies that serves specialized niche market, where consumers preference are quite different from aggregate markets (Lusk and Hudson, 2004). This quite well defines this study.

Consumer stated preference (WPT) values are useful in estimating demand where there is no data on consumer demand for quality improvements. In addition to solving the problem of missing 'behavioral data', WTP seeks households' opinions and preferences during the planning and design stage which approach is widely viewed as an important ingredient of the economic development process, as rightly put by Sen (1998),- participation is development. WTP survey also presents an important form of experimentation which lies somewhere along the spectrum of laboratory experiments and observational studies. Such survey based 'field experiments' represent a practical mix of control and realism. Control comes from the design of the survey sample and the structure of the survey instrument. Contrasted to the laboratory settings of experimental economics, realism comes from interviewing people in their homes about goods and services that are familiar and important to their daily life (Houtven *et al.*, 2006).

The use of willingness to pay (WTP) in economic evaluation is becoming increasingly popular. The technique has become a well-established tool for the evaluation of policies relating to safety and the environment Jones-Lee, (1989); Arrow *et al.*, (1993) and its application to health care and other fields is becoming more widespread (Diener *et al.*, 1998; Klose, 1999; Olsen and Smith, 2001). Although Contingent valuation (CV) is a method primarily used for monetary evaluation of consumer preferences for non market goods (e.g. unpriced natural resources), it is also useful in this context and has been applied to value organic food products Boccaletti and Nardella, (2000); Fu *et al.*,(1999); Gil *et al.*, (2000), rice, Dalton, (2004) and Indigenous vegetables Weinberger, and Msuya, (2004) and was used in this study.

Contingent valuation practitioners, experimental economists, and psychologists have long recognized that the use of different contingent valuation elicitation formats can result in divergent value estimates. Comparisons of field and laboratory elicitation studies, for example, indicate that there are systematic and significant differences between values elicited using continuous e.g., open-ended or payment card and discrete choice contingent valuation formats. While there are some exceptions values collected using dichotomous choice (DC) formats typically exceed values collected using open-ended (OE) formats. Comparisons of discrete choice values and payment card values show a similar relationship, with discrete choice values exceeding those obtained from payment card (PC) (Houtven *et al.*, 2006).

Evidence of elicitation effects has played a role in the continuing controversy over the use of contingent valuation. Some experts suggest that the discrete choice format is the preferred format. Others have suggested that failure to demonstrate consistency across value elicitation formats forms a basis for rejecting the validity of contingent valuation altogether (Welsh and Poe, 1998). However, the authors' further studies show that these approaches are relevant in understanding consumer preferences and both the open-ended and the payment card techniques elicit WTP measures that are consistent with a higher level of certainty.

The questions used in WTP survey can be either open ended or closed ended. In an open ended question, the respondent is asked to state the monetary amount that he or she is willing to pay for the service that is being valued. With a closed ended CV question (also referred to as a "dichotomous choice" or "referendum" question), the respondent is asked whether he or she is willing to pay a specified, shilling amount for the good being valued. The respondent then answers yes or no. Open ended questions, despite the fact that they provide more information than closed ended questions, can be especially difficult for respondents to answer because individuals are typically not accustomed to performing such tasks in daily life decision making. On the other hand, as much as the closed end type is easier for respondents to answer than open ended questions, this type of question may not reveal the respondent's maximum WTP as does the open ended. (Pattanayak *et al.*, 2006). This study adapted the open ended instead of the close ended elicit WTP for cowpea varieties for the quest to have detailed information. The study ensured consumers with maximum experience with the crop were considered by purposively selecting eastern Uganda which produces 90% of the countries crop (Adipala *et al.*, 1997.)

2.4 Analytical Methods to Estimate Willingness to Pay

The analytical methods for studying individual preferences are based on consumer behavior theory (Ben-Akiva and Lerman, 1985). The foundation of which theory is the concept that individuals choose from among alternative bundles of goods and services with the objective of maximizing their utility. Lancaster (1966) postulated that consumers derive satisfaction not only from the good itself but from the attributes or characteristics of the good. They will then strive to attain a product with attributes they most desire under their budget constraint. One way to measure consumer preference for attributes is their willingness to pay for attributes. Several analytical methods have been used in measuring consumer's acceptance and willingness to pay for products. These include; product improvement index model Thomas (2002), Analysis of Variance (ANOVA) Mead *et al.*, (1993) and hedonic pricing method (Ladd and Martin, 1976).

The concept underlying hedonic models is that the price of a heterogeneous good is a function of the attributes of that Good (Lancaster, 1966 and Larue, 1991). The model then tries to capture the relative importance of each attribute in determining the price of the good (Ladd and Martin, 1976). A hedonic model suggests that the price consumers are willing to pay for a product is a function of attributes (Hayes and Lence, 2002). The approach is based on the assumption of perfect competition and utility maximization and that, participants are price takers and have full information and the product is assumed to be purchased by consumers for its attributes (Ladd and Martin, 1976).

This approach has been applied in many contexts to estimate the implicit prices or values of non market goods (attributes). In agricultural markets, the approach has been used to estimate the attribute value of cotton by Bowman and Ethridge, (1984); Ethridge and Nipper, (1987), rice by Brorsen *et al.*, (1984); Dalton, (2004). Williams and Longworth, (1989) used the hedonic pricing approach to determine critical characteristics for yellow fin and bigeye tuna pricing at the Tsukiji market in Japan. Rosen, (1974) estimated hedonic pricing models to examine how product attributes affect price in perfectly competitive markets. Unnevehr and Gounzou, (1998) used hedonic modeling to investigate retail premiums for honey products. Price was regressed as a function of flavor, size of bottle, type of container and brand. The model explained up to 77% variation in honey price. Gillmeister *et al.*, (1996) used a hedonic price analysis to examine milk prices at farm level in USA and found out that demographic and socioeconomic variables influence the price paid for a particular product. In the U.S wine market, a hedonic pricing model based on sensory quality ratings was estimated (Schamel *et al.*, 1998). Studies by Deodhar and Intodia, (2002) on ghee indicated that consumers were willing to pay premium for branded over non branded ghee. Flavor was an important attribute valued by consumers.

Hedonic models as shown above have been widely used in consumer economics to evaluate the characteristics of food products. Following the standard hedonic price model, the price of cowpeas, P, is assumed to be described by a hedonic price function, P(x), where x is a vector of product characteristics. Consumers observe, at the moment of purchase, the intrinsic and extrinsic product quality cues but not the quality attributes. Intrinsic cues are characteristics of the product such as color, freshness, and aroma, while extrinsic characteristics affect quality perceptions such as price of the product, store, label, and popularity of the product. Steenkamp, (1990) writes, "Quality cues are what consumer observes, and quality attributes are what consumer wants."

Fewer hedonic studies, Tronstad *et al.*, (1992); Harper and Greene, (1993); Kajikawa, (1998) specifically look at price–quality relationships of legumes such as cowpea. Apart from hedonic models, techniques such as conjoint analysis and choice models have been used to examine consumer preferences for agricultural commodities like, legumes, apples, and livestock with differing characteristics (Manalo, 1990; Cheng *et al.*, 1996). The lack of
empirical work related to cowpeas characteristics is somewhat surprising; given the evidently growing importance of cowpea varieties and product attributes in it is marketing system both nationally and regionally.

While hedonic prices for cowpeas can provide interesting insights into the role of product quality in cowpea markets, a complete understanding of the relationship between cowpea prices and other product characteristics including variety, storage method, grain size, can provide important information to market traders regarding appropriate marketing strategies to manage inventories, and for assigning priority to factors that augment price premiums.

Furthermore, such information can allow plant breeders to assess the importance of key variety characteristics for strengthening the competitive position of cowpeas. A hedonic price model was therefore selected for this study.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This section handles the method used to for the study. It consists of a brief on the study area, the techniques used to come up with the sample, the data collection and analysis methods used.

3.1 Study Area

This survey study was conducted in the districts of Soroti and Kumi. These districts are found in the eastern region of Uganda. They were selected because it is where nearly 90% of the country's cowpea crop is produced Adipala *et al.*, (1997), and Cowpea production here is in transition- It was traditionally grown almost exclusively as a food crop for domestic consumption; however, with the demise of cotton as the main cash crop and the emergence of important external markets, many small holder farmers in the region now grow cowpea for cash markets (NARO/DFID, 2002, Sabiti *et al.*, 1994).

3.2 Sampling Techniques

A multi-stage sampling technique was used. The first stage involved purposive selection of the two districts. Within each district, two towns were purposively selected basing on consumption figures. Soroti and Kumi towns were then selected within which wards with highest number of consumers were selected. This was done to increase chances of having respondents with high experience with the crop. Household participation in market transactions depends on market existence and completeness and the type and magnitude of transaction costs they encounter, the study focused on Soroti and Kumi urban consumers as they access most of their grains from the market. This selection was done with help of district production office, local council officials and Serere Agricultural Research Institute researchers. Many criticisms of contingent valuation(CV) methods focus on the intangibility of valuing the good in question and hence this criterion ensured that consumers with high experience with the crop attributes were considered in order to minimize any bias introduced through unfamiliar and abstract traits (Dalton, 2004., CIE., 2001).

Forty households were then randomly sampled from a list of all households prepared in consultation with local councils using the bowl and fish method. The unit of analysis was a household. A total of eighty one respondents were selected from Soroti (Serere and Soroti towns) and eighty from Kumi (Kumi and Bukedia towns). This depended on the population of the districts. A total of one hundred and sixty one consumers were interviewed.

From a list of local markets two that handle highest volumes of cowpeas in each district were selected. From these markets a list of cowpea traders were prepared with the assistance of market administration. Ten traders were selected from each market giving a total of twenty traders from each district. Each trader was presented the samples for sensory evaluation. From the list of ten respondents, two traders were selected as representatives from which to collect market information as contact traders for one week. Two focus group meetings were held with these traders and one for consumers in each district (Soroti and Kumi), both male and female in attempt to understand the way the grains are prepared and the consumer attitudes.

3.3 Data Sources and Collection

The primary data from households was collected through interviews using semi and structured questionnaires. The secondary data were collected from office of DAO, Soroti and Kumi Districts.

Two trained research assistants were employed in data collection and the researcher supervised them as he moderated the four focus group discussions. From the field, information on household characteristics, tastes and preferences for cowpeas were collected for analysis. Other relevant information was collected from the district production offices. The study relied more on primary data collected from the field.

3.4 Preparation of Sample and Data Collection

Consumers were shown samples of each variety (*Icirikukwai, Ebalat, SECOW1T, SECOW* 2W and Kenyan) Adipala et al., (1999), NARO/DFID, (2002) and asked to rate each variety according to its provision of attributes. Experimental samples were prepared, coded (Sample 5, sample2, sample4 sample3 and sample 1, respectively) with the help of Serere Agricultural Research Institute researchers to eliminate name bias and presented to respondents. The attribute information provided by respondents for each variety was then cross checked against taxonomic information on cowpea varieties, which is well documented, to verify whether consumer's perceptions of variety attributes are consistent with established scientific records (Svetlana, 2007).

3.5 Data Collection and Data Types

Data consisting of sensory evaluation, prices consumers would be willing to pay; actual market prices paid for the various varieties of cowpeas were collected. One section of the question gathered information on the socio-economic characteristics of the respondents including age, education, gender, income, household size and income. In the other part each respondent was shown samples of cowpea varieties to evaluate sensory attributes including seed coat color, and seed size. After evaluating the above attributes, consumers were asked about their awareness and knowledge about the different varieties.

Respondents were then asked an open ended question of how much they are willing to pay per kilogram of each sample. They were given chance to re-arrange their rankings and willingness to pay values until they were satisfied that the values are representative of their choices. For market prices, contact traders recorded, selling price per variety, Quantity sold, type of Vendor (Retail trader/consumer), and destination of the cowpea. The retail markets were chosen to reflect the full range of preferences displayed by different income classes. All samples were collected within one week in order to minimize price variance due to factors other than quality (Adapted from, Unnevehr, 1986).

3.6 Data Analysis

3.6.1 Analytical Approach

Data on socio economic characteristics of respondents, consumer evaluation, attitudes, willingness to pay prices were coded, summarized and descriptive statistics (Cross tabulations, frequencies, means, standard deviations, and t-tests) were generated using STATA package Version 9.0, SPSS version 11 and excel.

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To determine the effect of cowpea attributes, and consumer characteristics on willingness to pay for cowpea varieties, a hedonic pricing model was used. It was used to estimate the extent to which attributes like grain size, eye color, grain color, meal making suitability and consumer socio economic characteristics like gender, education income, and household size affect willingness to pay for cowpeas.

3.6.2 Model Specification

Willingness to pay responses were screened for validity and consistency with several tests. A test of the mean willingness to pay for varieties that the consumer wished to purchase, versus those that are not to be consumed. Secondly for each consumer, ordinal preference rankings of the varieties were compared against stated willingness to pay for a crop of choice to determine whether stated varietals preferences coincided with expressed expenditure patterns for crop. Under the axiom of revealed preference, a variety is weakly preferred over another if expenditure for the variety is non-decreasing when compared with an inferior variety and strictly increasing if the variety is strongly preferred. This stated willingness to pay for each sample was used as the dependent variable in the hedonic model.

3.6.3 Hedonic Model Frame Work

This is based on Lancaster's (1966a, b) model of consumption theory. He regards the characteristics of the good and not the good it is self as the direct object of utility. This concept has widely been used to estimate demand for quality of goods. Thus, price differences across different units of transactions are due mainly to quality differences that can be measured in terms of the characteristics. Ladd and Suvannunt (1976) used this

concept to develop the consumer goods characteristics model which describes the price of a good as a linear summation of the implicit value of its attributes. They showed that;

Where;

Pi is the market price of product *i*, X0j the total amount of the m^{th} product characteristic provided by consumption of all goods, q_i the amount consumed of product *i*, and *E* is total expenditure.

 $dX0j/dq_i$ is the marginal yield of the j^{th} product characteristic by the *i*th product.

The marginal utilities of the *j*th product characteristic and of income are respectively dU/dX0j and dU/dE.

If we assume that expenditure equals income, ((dU/dX0j)/(dU/dE)) can be regarded as the marginal implicit price of the *j*th characteristic. This may be represented by βij if we assume a constant marginal implicit price.

Given that most product characteristics are constant, the marginal yield (dU/dX0j = Xij), may be assumed constant. In terms of the current cowpea demand analysis, Eq. (1) can be expressed as:

$$Pi = \sum Xij\beta ij + v$$
(2)

Where P_i = price, (WTP) of cowpea varity i (Ug.sh) *Xij* the quantity of cowpea grain characteristic *j*, such as: size of grain, Testa colour, testa texture and eye colour β_{ij} the implicit price of characteristic *j*, to be measured and *v* is a stochastic error term. Regressing product characteristics as measured by the X*ij* provides a test of the hypothesis that pi is linearly related to the X*ij*'s.

Stated willingness to pay (WTP) for cowpea grain was used as the dependent variable in the hedonic model. (*Pi*)

The estimates of implicit values of characteristics can be used to estimate the price of an unobserved product by valuing embodied characteristics (Dulberger, 1989). Hence the implicit prices for characteristics derived from hedonic estimation help highlight areas for future cowpea research and policy initiatives.

3.6.4 Estimation

Most researchers have estimated the hedonic function above through regression analysis. By regressing consumer good prices on characteristics, a coefficient representing the implicit price of characteristics can be derived. This is the approach that has been pursued by Uri *et al.*, (1994), Veeman, and Adomowiez (2000), Brorsen *et al.*, (1984), Ladd and Suvannut, (1976) Triplett, (1986), Lowenberg-DeBoer, (2002) Dalton, (2004), Waugh, (1928, 1929) and was adapted for this study.

For each of the Varieties, the following hedonic equation was specified:

 $Pi = \alpha + \sum \beta i Xi + \sum \psi Yi + \nu$ (3)

Where;

Pi = Willingness to pay for a Kilogram cowpea grains of variety i in Uganda Shillings.

Xi = Consumption attributes as defined in table 3.1

 β_i = is the estimated coefficient on the consumption attributes,

Yi = Household socio-economic characteristics as defined in table 3.1

 ψ_i i = 1....40, is coefficient for household socio- economic characteristics.

v = Stochastic error term.

| Attribute(X) | Measurement | | | |
|--|---|--|--|--|
| Seed coat Color | (5) Excellent (4) Good (3) Fair (2) Bad (1) Very bad | | | |
| Seed shape | (5) Excellent (4) Good (3) Fair (2) Bad (1) Very bad. | | | |
| Seed meal making suitability properties: | (5) Excellent (4) Good (3) Fair (2) Bad (1) Very bad. | | | |
| (SMS) | | | | |
| Grain size | (5) Excellent (4) Good (3) Fair (2) Bad (1) Very bad. | | | |
| Grain eye color | (5) Excellent (4) Good (3) Fair (2) Bad (1) Very bad | | | |
| Time taken for grain to cook. | In minutes | | | |
| Grain damage tolerance | 1 (does not tolerate), 2(1-10%), 3 (10- 20%), 5(No | | | |
| | important). | | | |
| Grain color mixes(GCM); | Important = 0, Not important = 1 | | | |
| Grain size mixes | Important = 0, Not important = 1 | | | |
| Socio economic characteristics(Y) | Measurement | | | |
| Education | Number of years of schooling of household head | | | |
| | (Measured in years spent in school) | | | |
| Income of respondent | Respondents were asked /guided to estimate their | | | |
| | annual cash earnings (Ug. Shillings) | | | |
| Gender | Female = 1, male = 0 | | | |
| Household size | Number of family members in the household. | | | |
| Awareness | Aware of the Variety = 1, Not aware = 0 | | | |

 Table 3.1: Attributes in the Model

To ensure validity of the data, multicollineality was tested using two methods; Covariance matrix and Variance inflation tests. None of the variables were highly correlated with each other and the researcher went ahead to estimate the model in equation 3 above using ordinary least squares (OLS).

CHAPTER FOUR

RESULTS AND DISCUSION

4.1 Introduction

This chapter presents and discusses the empirical results based on the data collected from 161 urban households and traders of Soroti and Kumi districts. The results are summarized as means, percentages and coefficients. This chapter has four sub sections, the first looks at the socio economic characteristics of the urban cowpea consumers and their knowledge and attitude towards the different varieties of cowpeas. The second part looks at cowpea attributes considered by consumers when buying cowpeas. The third part deals with consumer willingness to pay for different varieties in terms of mean prices and then the last part focuses on the factors that influence willingness to pay for cowpea varieties using Hedonic pricing model. The Varieties grown in the study area and considered in the study are presented in table 4.1

| Sample label | Actual Name | Characteristics | | | |
|--------------|-------------|---|--|--|--|
| 1 | Kenyan | Black testa, white eye color and small seeded. | | | |
| 2 | Ebalat | White testa color, small seeded, white eye color, traditional variety | | | |
| 3 | SECOW 2W | White testa, relatively large seeded, white eye color, improved new variety | | | |
| 4 | SECOW1T | Tan seeded and large sized white eye color. improved new variety | | | |
| 5 | Icirikukwai | White seeded and small sized, white eye color, traditional variety | | | |

 Table 4.1: Samples Used in the Model

Actual Name

Samnle lahel

4.2 Socio-economics Characteristics of Urban Cowpea Consumers

Characteristics of consumers of cowpeas such as age, household size, gender and education are important in conducting product market acceptance studies because they influence consumption patterns and willingness to pay (Campiche, *et al, 2004*). Certain foods be it, animal source foods, legumes or fruits and vegetables may be consumed in insufficient quantities either because they are given low preference due to lack of nutritional knowledge, or because they are not affordable. Food and nutritional policies therefore require detailed knowledge of the interaction between household socio economic characteristics, food prices, and food and nutrient choice (Abdulai and Aubert, 2003). Some socio-economic characteristics of the respondents are as presented in table 4.2.

| Variable | Mean(n= 161) | Standard deviation |
|--------------------------------|--------------|--------------------|
| Age (years) | 37.9 | 15.458 |
| Education (years of schooling) | 7 | 3.826 |
| Household size | 5 | 2.223 |
| Income (Mean annual income Ug. | 2,210,000 | 2569.513 |
| Shillings) | | |

 Table 4.2: Socio-economic Characteristics of Urban Cowpea Consumers

The average age of the respondents was 37.9 years, this being the economically active age group in Uganda and are likely to have some disposable income. The mean educational level for the respondents was primary seven. They on the average have five members in their family and earn monthly income of about 184, 000/= (US\$ 93.4) which translates in to daily income of 6000/= (US\$ 3.11), which is higher than the poverty line of 1US\$ a day meaning high purchasing power of the interviewed group.

Table 4.3 shows that 65.8% respondents were female and 34.2% male. This could imply women appreciate the crop more than their male counterparts, being a food security crop. IFPRI, (2001) describes equity concerns for economic growth in terms of helping vulnerable groups; women and smallholder farmers improve food security. This could imply that cowpeas play key role in economic growth as it is a food security crop that supports the families immediately after dry season Adipala et al.,(1999) and cherished by women as they are charged with the responsibility of providing and making food decision for about 55% of families (table 4.4).

| Gender of respondent | Freq. | Percentage |
|----------------------|-------|------------|
| Male | 55 | 34.16 |
| Female | 106 | 65.84 |
| Total | 161 | 100.00 |

| Table 4.5. Genuer of Responder |
|--------------------------------|
|--------------------------------|

In line with gender roles, in this study, 55% of the mothers were found to be concerned with household chores in terms of food decision in the household while 45 % of the male are involved in the same decision (table 4.4). This finding is in line with traditional institutions and sexual divisions of labor as much as this thinking is being influenced by western influences (Plattnum, 1989 and Ravnborg, et al., 2004).

| Table 4.4: Food Decision in the Household. | | | | | | |
|--|-----------|------------|--|--|--|--|
| Who decides what to eat at | Frequency | Percentage | | | | |
| home | | | | | | |
| Father | 73 | 45.3 | | | | |
| Mother | 88 | 54.7 | | | | |
| Total | 161 | 100 | | | | |

The study revealed that decisions within the households pertaining what to consume for the day is made by 55% of the mothers and 45% by fathers. In accordance with previous studies, experience, exposure and knowledge Hallman (2000), values and beliefs Baker and Burnham (2001), socio economic status and demographic characteristics are important in determining food decision of individuals and should be of interest to policy makers and planners. For example, according to Abdulai and Aubert (2003) women's schooling and income have significant influence on the consumption of foods with high nutritional value. These results suggest women are a key avenue for food related policy interventions targeting the family.

4.3 Consumer Awareness and Attitudes towards Cowpeas

Consumer awareness is important in creating an environment for consumers to develop product familiarity and the ability to evaluate different alternatives available for satisfying want. According to Zellner (1991), familiar foods are generally liked more than unfamiliar foods. Krishnan *et al.*, (1999) in a study on consumer willingness to pay for sea foods and domestic market development indicated that, good knowledge, and awareness by consumers have a positive influence on willingness to pay for sea foods and domestic market development. Therefore consumer's awareness and attitude of the varieties were investigated and the results are reported in table 4.5.

| Tuble 4.5. Response (70) of Consumer awareness of Compea varieties | | | | | |
|--|--------|-------------------------|--|--|--|
| Variety | Sample | Percentage aware of the | | | |
| | | Variety(%)(N=161) | | | |
| Kenyan | 1 | 70.25 | | | |
| Ebalat | 2 | 98.09 | | | |
| SECOW 2W | 3 | 93.59 | | | |
| SECOW 1T | 4 | 62.26 | | | |
| Icirikukwai | 5 | 99.38 | | | |

 Table 4.5: Response (%) of Consumer awareness of Cowpea Varieties

In the efforts to find consumer knowledge of the crop and its varieties and the value of the knowledge, 92.6% of the respondents emphasized the importance of the need to be able to identify the different varieties of cowpeas, while only 7.41% did not feel the need. Focus group discussion with market vendors in Soroti and Kumi revealed that the type of cowpeas grown or purchased is important depending on the intended purpose, for example, those buying for re- sale would want types that have high demand, but for home consumption normally go for the common varieties.

The percentage awareness for *Ebalat*, *SECOW 2W* and *Icirikukwai* varieties, according to table 4.5 is over 90%. This could imply that the respondents were conversant and familiar with the samples. Similarly, considering all the 5 samples from table 4.5, at least all the samples scored over 60% as far as awareness is concerned. Focus group discussions with women in Kumi did reveal that many of the consumers find it hard to differentiate between, *Ebalat*, *Icirikukwai* and the newly introduced *SECOW 2W*, this could be true due to the fact that these three have white seed coat color and almost same size, which according to figure. 4.4 are the most important qualities valued by consumers for meal making suitability.

4.3.1. Attitude towards Cowpea

The researcher also attempted to assess the attitude that respondents have towards cowpeas by asking a range of yes/ no questions. As indicated in figure 4.3 and table 4.6, overwhelming majority of respondents (99.4%) stated that they do prepare a meal out of cowpeas.

| Meal production out of Cowpeas | Frequency | percentage |
|--------------------------------|-----------|------------|
| Yes | 160 | 99.38 |
| No | 01 | 0.62 |
| Total | 161 | 100 |

Table 4. 6: Meal Production out of Cowpeas

As shown in Figure.4.2, 71% serve cowpeas to visitors. This finding is in agreement with that of Weinberger and Msuya (2004) in a study on vegetables in Tanzania, where 90% of the consumers serve vegetables like cowpeas to visitors. Women in focus group discussion in Kumi revealed that visitors are served with the best the family can offer, which normally takes the form of chicken, slaughtering goat or purchasing meat from the market. In all the servings' they said, cowpea, pasted in simsim or groundnuts is a given. It is almost served by every family for all visitors most especially visitors that come from towns or the city. This expression means a lot for local market potential for the crop, if promoted and strengthened, it can become a stable delicacy for all income and age groups, as there are signs that those from urban settings or cities still treasure it.



Fig. 4.1: Serving Cowpeas to Visitors

Cowpeas value could further be expressed with the help of figure 4.2 which shows that up to 73 % of the respondents would serve it on special occasions, such as weddings, burials and religious holidays. Key informant discussions with contact traders also revealed that cowpeas are still being used culturally by the elders to thank and appease the gods, by offering the first pinch of food to them. This in a way helps in perpetuation of biodiversity.



Fig. 4.2: Serving Cowpeas on Special Occasions

Similar to findings by Weinberger and Msuya (2004) in a study on vegetables in Tanzania, all focus groups in Soroti and Kumi reported overwhelmingly that cowpeas make important contribution to their diet when there is food shortage. '*cowpeas are a real friend in need, within 2 to 3 weeks of planting it can save your life, its here to stay as expressed by a lady in focus group discussion in Kumi*'. This popularity and positive attitude towards the crop can be explained by the fact that cowpea is a drought-tolerant crop, ideal for the dry conditions in the study area. Cowpeas have high protein content, sources of energy and micronutrients as is associated in diets of isolated communities Grivetti and Ogle, (2000) characteristic of

the study area. They require lower soil fertility than many other crops Coetzee, (1995), making it a food security crop (Schippers, 1997). These could be some of the reasons for its popularity in Soroti and Kumi, given the unpredictable hot climate in the study area, with poor soils. On the socio-economic side, the high popularity could be due to the fact that it has become a source of income with markets locally, regionally and internationally (Adipala *et al.*, 1994). According to Humphry *et al.*, (1993), Smith *et al.*, (1995, 1996), cowpeas also serve as primary foods or secondary condiments to dishes which justifies their presence in almost every meal in West Africa.

4.3.2 Consumption by Age Groups and Sex

As shown in figure 4.3, cowpeas are well consumed by over 90% of all the age groups and gender, both adult and children and consumers are well aware of all the 5 varieties of cowpeas (table 4.5). This could imply that there is a potential market for the product and this information is important for marketing the crop, since according to Bruin *et al.*, (1994) consumers are willing to buy a product when provided with information concerning the product or products they are aware of.



Fig. 4.3: Cowpea Consumption by Age Group

However, study results in table 4.7 also show that it is only 80% of the parents who teach their children how to prepare a meal out of the crop, meaning one out of five households do not teach their children how to prepare the crop. This could imply that the skill to produce, store and prepare a meal out of the product may be lost to the future generation.

| Parents teaching Children | Frequency | percentage |
|---------------------------|-----------|------------|
| Yes | 129 | 80.12 |
| No | 32 | 19.88 |
| Total | 161 | 100 |

 Table 4.7: Parents Teaching their Children to Prepare Cowpeas

According to Weinberger and Msuya (2004) in a study on vegetables in Tanzania, when vegetables like cowpeas are not prepared and consumed, this is the first step to their extinction especially when the young generations are not taught to embrace the crop. This has grave implications for the future of cowpeas in Uganda and it could mean that less and less of the younger generation will develop love for the crop.

4.4 Seed Property Consumers Value for Meal Making

Seed color is considered by 56% of the interviewed households as the most important quality factor for meal making while 39 % consider seed size as most important quality characteristics for making decision on consumption and seed suitability (Figure. 4.4).



Fig. 4.4: Seed Property Valued by Consumers for Meal Making Suitability

Studies by Wolfson *et al.*, (1989) on farmer's preference for cowpeas and then repeated by Lowenberg-Deboer, (1996) in Cameroon, revealed the preference of farmers for and importance of seed size and color as selection criteria for a good seed with market potential. Their reports indicate that large white-seeded cowpeas are more readily marketed and are typically sold at a premium amongst a wide array of landraces varying in seed type and color. They concluded that it is an indication of increasingly important role of cowpea as a cash crop. Further studies by Langyintuo *et al.*, (2004) on consumer preference for cowpeas in Cameroon and Ghana revealed that most consumers there prefer large grain size. They further noted that consumer tastes and preferences are reflected in the market through price discounts and premiums that consumers pay for visible grain characteristics. In some cases,

these visible indicators are proxies for some biochemical characteristic, such as cooking time, sucrose level or protein content. In other cases, the visible characteristics are directly related to the way cowpeas are used in food preparation.

The women in Kumi focus group discussion seem to prefer large white or brown seeded for the reason that it mixes well with their traditional way of pasting with simsim or ground nut paste, giving rise to eye-catching source. They also at times roast the grains to be consumed as a snack and they said the white color is better for this purpose.

4.5 **Consumer Evaluation of Cowpea Attributes**

In order for consumers to accept and pay for a product, that particular product must contain attributes that are considered most important and attractive to their attention and they form the basis for their preferences (Benedict *et al.*, 1996). The results of urban consumer evaluation for grain color, eye color, and seed size are presented in table 4.8

| Cowpea | Grain | Grain | Grain | Grain | eye | Meal makin | g |
|-------------|-------------------|-------------------|-------------------|-------------------|-----|-------------------|---|
| Variety | Color | shape | size | color | | suitability | |
| Kenyan | 1.53 [°] | 2.32 ^d | 1.72 ^d | 2.31 ^e | | 2.22 ^e | |
| Ebalat | 4.15 ^a | 4.46 ^b | 4.24 ^a | 2.64 ^d | | 4.19 ^d | |
| SECOW 2W | 4.15 ^a | 4.46 ^c | 4.22 ^a | 3.07 ^c | | 4.18 ^c | |
| SECOW 1T | 3.19 ^b | 3.89 ^a | 3.29 ^c | 3.03 ^b | | 2.61 ^b | |
| Icirikukwai | 4.15 ^a | 4.47 ^a | 4.23 ^b | 4.41 ^a | | 4.17 ^a | |
| C.V (%) | | | | | | 31.92 | |
| | 28.89 | 26.27 | 27.59 | 36.86 | | | |
| | | | | | | | |
| F-Value | *** | 2.04** | 4.57^{***} | 2.44^{***} | | 3.38*** | |
| | 17.70 | | | | | | |

 Table 4.8: Mean sensory scores for cowpea variety attributes by consumers in Kumi

 and Soroti district

NB: means with the same letter in the same column are not significantly different.

***, significance at 1%, **, significance at 5%

Scale: 1= very bad, 2= Bad, 3= Fair, 4= Good, 5= Excellent

Ebalat, *SECOW 2W* and *Icirikukwai* had significantly (P =0.000) higher average score for grain color, while *Kenyan* had the least score. The *Kenyan* variety black seed coat color could have been the influencing factor, while *SECOW1T* being tan in color, and less preferred to the three. In a related study, Watters *et al.*, (2002), noted that color plays crucial role in first impression and evaluation of food based on visual assessment and found a positive implication on acceptance of raw apples. Adipala *et al.*, (2002) also found out that farmers in the study area would select white seeded cowpeas for local consumption and only grow the black seeded for export market. This connects very well with the findings of this study that consumers in the study area too prefer white seeded cowpea, which agrees with studies done by Kitch *et al.*, (1998) in West Africa concluding that the importance of seed size and color as selection criteria appears to reflect the increasingly important role of cowpea as a cash crop, which also agrees with previous studies by Sabiiti (1994) in the study area on farmers seed selection.

The grain shapes for the four varieties with exception of *Kenyan* were consistently above the score 3.5 (between fair and good) which could imply that all have acceptable grain shape (figure 4.5). The *Kenyan* scored least (2.32). *Icirikukwai* and *SECOW 1T* did not score significantly different from each other, so did *Ebalat* and *SECOW 2W*. However, Focus Group Discussions (FGD) in Soroti and Kumi and figure. 4.4 indicate that consumers did not take grain size as key factor that influences their choice for meal making suitability. *Icirikukwai* was scored highest and best as regards grain shape, followed by *Ebalat* and *SECOW 2W*.

The results of evaluation of grain size showed, *Ebalat*, and *icirikukwai* to be more superior to all the varieties, followed by *SECOW2W*. However, all the other 4 varieties except the *Kenyan* scored above 3.0, possibly implying are acceptable by consumers as opposed to the Kenyan variety, which scored, barely 1.72. These results agree with studies by Kitch *et al.*, (1998) in West Africa which indicate that large white-seeded cowpeas are more readily marketed and are typically sold at a premium.

From Figure. 4.4, seed eye color did not appear as important factor in consumer consumption decision, how ever, all the samples under consideration had white eye color which varied in size and consumers scored *Kenyan* and *ebalat* varieties rather lower than the other three. How ever these results were not statistically significant except for *Icirikukwai* and SECOW 2W.

Consumers scored *Ebalat, Icirikukwa*i and *SECOW 2W* significantly (P= 0.01, 0.019 and 0.096 respectively) highest as being most suitable for meal making while the black seeded *Kenyan* type and the tan colored introduced *SECOW1T* were scored least. This is in line with earlier studies by Adipala *et al.*, (1999) who found that farmers in eastern Uganda, made choice of variety depending on production goal, *Icirikukwai* and *Ebalat* being preferred by farmers to satisfy household and local demand, while the Kenyan for external market.



Figure 4.5: Mean Rank Scores of Cowpea variety in Soroti and Kumi Districts

Among all the varieties available in the study area, as shown in figure. 4.5, consumers ranked *Icirikukwai* as the leading variety, followed by *Ebalat* and *SECOW 2W* (A newly introduced Variety). The black seeded *Kenyan* variety was least ranked by consumers. *Icirikukwai*, is a local variety popularly grown by locals for consumption according to Adipala, *et al.*, (1999) and more preferred probably because the consumers are familiar with it (Zellner, 1991). The secondly ranked *SECOW 2W* being a newly introduced variety very similar to *ebalat. SECOW 2W* is likely to have marked impact in terms of market potential since consumers seem to like it, and so the more reasons for promoting it.

Among the two newly introduced varieties, the white seeded SECOW 2W was the leading choice as compared to the tan seeded, SECOW 1T, and the black seeded Kenyan showing the value Ugandan consumers attach to seed color in their decision to purchase or consume. Among the local varieties, *Icirikukwai* was rated higher than *Ebalat*.

4.6 Willingness-to-pay for Cowpea Varieties

Consumers reported considerable price differences for the five analyzed varieties. Prices for Icirikukwai, ebalat and SECOW 2W being higher than that of Kenyan and SECOW 1T

| Table 4.9: Mean Willingness To Pay (WTP) ⁻ for Cowpea Varieties | | | | |
|--|---------------|-------|--|--|
| Samples(Variety) n=161 | Mean (Ug. Sh) | S.D | | |
| WPT1(Kenyan) | 584.9b | 240.6 | | |
| WPT2(<i>Ebalat</i>) | 1439a | 564.3 | | |
| WPT3(SECOW 2W) | 1453a | 598 | | |
| WPT4 (SECOW 1T) | 920b | 262.6 | | |
| WPT5(Icirikukwai) | 1456a | 598 | | |
| | | | | |

-----. . . . -- . .

Means with same letter (a or b) are not significantly different (Pr(T < t) = 0.00) by pair wise t test of least squares.

Table 4.9 reveals that the absolute difference in willingness-to-pay being less dramatic across Icirikukwai, Ebalat and SECOW 2W and is quite distinct between these three and Kenyan and SECOW 1T. The results from the study show that consumer willingness to pay for *Ebalat*, *Icirikukwai* and the introduced *SECOW 2W* are not significantly (Pr(T < t) = 0.00) different from each other and that between the Kenyan and SECOW 1T were also not significantly (Pr(T < t) = 0.00) different. The similarity in consumer preference for *ebalat* and

¹ WTP1-WTP5 Are prices consumers were Willing To Pay for Varieties 1-5

icirikukwai could be as a result of the fact that consumers are familiar with these traditional varieties. It is important to note that *SECOW 2W* has similar physical properties as these two traditional varieties and according to focus group discussions; consumers can not easily differentiate it from *ebalat*.

4.6.2 Market Performance of Cowpeas in Soroti and Kumi

Marketing is a prime mover and stimulator of production. The marketing system is a major tool of integrating the farming community into the market economy. It links various rural areas as well as rural and urban areas with a network for communication and exchange, which forms the basis for co-ordination of social and economic activities. The provision of secured market outlets gives the incentive to increase output and to diversify subsistence production into market farming. Marketing also provides for the transfer of preferences and pressures, (through the price system), from consumers to producers, thus supporting further diversification and specialization in agriculture.

The increased integration of the economy along the marketing channels opens the way for spreading modernization to traditional rural areas (Bibangambah, 2002). For these commodity-dependent, low-income, food-deficit economies, the price instability that is characteristic of agricultural commodity markets can have pronounced impacts on employment, income, government revenue, food security and market performance (Sarris and Hallam, 2006). The researcher traced price trends to give a view of performance of cowpea in the market.



Fig. 4.6: Cowpea Price fluctuations in Kumi

Source: Kumi District Production Department

According to studies on cowpeas by Afolami (2002) in West Africa, despite the many advantages of cowpeas to consumers and producers, a major problem of cowpea production is price differential over space and time among varieties. This study endeavored to examine the trend of prices of cowpeas over six year's period as well and results discussed with traders. According to focus group discussion held in Soroti with traders, price varied over space in excess of transportation costs. This could be the result of inadequate market information, poor road networks and inadequate market infrastructure. There is also price variation over time in excess of storage cost. This could be the result of inefficient storage facilities, yet the grains are prone to weevil attack.

The general price trends for farm gate and market price shown in Figure 4.6 depict price series that tend to both to be upward moving over the years. The general trend of steady increase in prices according to Sarris and Hallam (2006) as associated with agricultural commodities could be indicator of how important cowpeas have become in terms of trade and household income in Uganda.

In all the markets studied traders did not make a distinction between their products in terms of variety during the time of study, which they felt the consumers did not mind except for the *Kenyan* Variety. This situation was also observed by Svetlana and Melinda (2006) in a study on bananas and they concluded that; although output markets for crop products exist in rural Uganda, they are often incomplete, failing to capture quality differentials among varieties, further leading to product market failure, and portrays a non tradability constraint that could have existed. All the grain had all the varieties mixed up in terms of shape and size. The traders were only keen to remove the *Kenyan* variety which actually was not available in the local markets studied during the study period.

| tor competition | or our und Rumm mur net | | | | |
|-----------------|--|---|---|-----------------------|-----|
| Variety | Mean prices consumers were willing to pay(Ug.Sh/Kg) | Mean Actual Market price(Ug.Sh/ Kg) | Diff mean(WPT)- mean(mktprce)(Ug. Sh) | t-value | Df |
| Kenyan | 584.9 | 1148 | -561.0435 | 29.5871*** | 160 |
| Ebalat | 1439 | 1148 | 291.441 | 6.5534 ^{***} | 160 |
| SECOW 2W | 1453 | 1148 | 305.1056 | 6.4735*** | 160 |
| SECOW 1T | 920 | 1148 | -227.8137 | 11.0060**** | 160 |
| Icirikukwai | 1456 | 1148 | 308.8323 | 6.5494*** | 160 |
| | | | | | |

 Table 4.10: Mean prices consumers were willing to pay and actual mean market price

 for cowpea in Soroti and Kumi markets

*** Mean differences(Diff) statistically different from zero at 1%, using pair wise t test

(Ho: diff = 0, Ha: diff < 0 Ha: diff! = 0 Ha: diff > 0)

Comparison of prices consumers were willing to pay for individual grain varieties and the market grain prices showed there were significant differences. The results showed that consumers would pay more for grains of *Ebalat, Icirikukwai* and *SECOW2W* if traders or producers sorted out their produce according to variety compared to what the market offered during the data collection time (Different varieties all mixed up). As shown in table 4.10 the market price for what was available in the market during time of study, was significantly (Pr (T < t) = 0.0000) higher than what consumers were willing to offer for pure grains of *Kenyan* and *SECOW1T* varieties. The consumers indicated that they were willing to pay significantly (Pr (T > t) = 0.000) higher price for pure grains of *ebalat, icirikukwai* and *SECOW2W* than the market price during time of study.

4.7 Determinants of Consumers willingness to pay for the different Cowpea Varieties

The estimated models fitted the data reasonably well given the variables used. The R-square values for the five samples being, 61%, 42%, 35%, 35% and 37% for *Kenyan, SECOW 1T, Icirikukwai, SECOW 2T and Ebalat* respectively. The results are consistent with that of Commer (1990) and that of Lansford *et al.*, (1995) who worked on explaining the prices of race-bred yearling quarter horses, and obtained R-square value of 0.38 and 0.40, respectively, Akankwasa (2007), who estimated consumer willingness to pay for introduced desert bananas in Uganda obtained R-squared values of 21%, 23% and 17%. Given the fairly good performance of the linear model in terms of fit and the logical consistency of the estimated parameters, it was adapted for use in the subsequent discussion.

| Cowpea Variety | | | | | | | | | | | |
|------------------------|----------------------|--------------------------|--------------------|------------------------------------|----------------------|----------------------|-------------------|--------------------|----------------------|------------------------|--|
| | Kenyan | | SECOWIT | | Icirikukwai | | SECOW 2W | | Ebalat | | |
| Variable Age | Coef -0.17 | t. Value -0.19 | Coeff. 2.47 | t. Value 2.13 ^{**} | Coeff 0.99 | t. Value 0.36 | Coeff 0.55 | t.Value 0.2 | Coeff 1.92 | t.Value 0.74 | |
| Household Income | -6.60E-06 | -1.27 | -1.50E- 05 | -2.24** | 3.60E- 05 | -2.23** | -4E-05 | -2.23** | -3E-05 | -2.29** | |
| Education of H/H | -2.79 | -0.74 | 7.98 | 1.62 | -1.12 | -0.09 | 1.61 | 0.13 | -0.348 | -0.03 | |
| Gender | 36.86 | 1.2 | 80.71 | 2.01** | 138.52 | 1.39 | 162.1 | 1.61 | 101.92 | 1.12 | |
| H/H size | 9.67 | 1.59 | -4.73 | -0.6 | -32.26 | -1.67* | -37.43 | -1.92* | -32.88 | -1.84* | |
| | | | | | | | | | | | |

 Table 4.11a: Results from Estimated Hedonic Model for Cowpea Varieties (Socio-economic Variables)

NB;* Significant at 10%

** Significant at 5%

*** Significant at 1%

| | Kenyan | | SECOW1T | | Icirikukwai | | SECOW 2W | | Ebalat | |
|--|-----------------------|---|--------------------|---|------------------------|--|---------------------|--------------------------|---------------------|---------------------------|
| Variable Seed coat Color | Coef -45.27 | t. Value -2.86 ^{***} | Coef. 66.58 | t. Value 3.61 ^{****} | Coeff 217.77 | t. Value 2.36 ^{***} | Coeff 230.13 | t.Value 2.55** | Coeff 232.57 | t.Value 2.99*** |
| Seed shape | -39.62 | -2.74*** | -8.09 | -0.36 | -44,75 | -0.96 | -52.31 | -1.11 | -37.45 | -0.88 |
| Grain size | 89.21 | 5.74*** | 73.45 | 3.95*** | 168.46 | 1.79 [*] | 200.52 | 2.11** | 148.8 | 1.93* |
| Grain Eye color | 18 | 1.22 | -13.01 | -0.73 | 37.78 | 0.74 | 11.49 | 0.31 | 76.42 | 2.22** |
| Grain size mixes | 22.84 | 0.78 | 18.01 | 0.46 | -34,29 | -0.36 | -25.88 | -0.27 | -42.89 | -0.49 |
| Grain color mixes | -6.28 | -0.22 | -15.35 | -0.39 | 22.15 | 0.24 | 6.29 | 0.07 | 10.38 | 0.12 |
| Time taken to cook | 0.96 | 0.88 | -0.39 | -0.32 | 3.44 | 0.97 | -3.53 | -1.08 | -1.06 | -0.24 |
| Meal making | 96.31 | 6.19*** | 53.35 | 3.02*** | 73.44 | 1.72^{*} | 73.33 | 1.76* | 88.23 | 2.27** |
| Constant | 220.76 | 1.83* | 57.619 | 0.29 | -557.92 | -0.8 | - 449.98 | -0.93 | -536.59 | -0.81 |
| F-test | 14.1 | | 6.65 | | 4.49 | | | 4.85 | | 5.3 |
| R^2 | 0.61 | | 0.42 | | 0.35 | | | 0.35 | | 0.37 |
| NB;* Significant at 10% ** Significant at 5% *** Significant at 1% | | | | | | | | | | |

 Table 4.11b: Results from Estimated Hedonic Model for Cowpea Varieties (Grain Characteristics)

The results from the hedonic models (table 4.11a and 4.11b) for all the five samples indicate that some of the socio-economic characteristics and cowpea attributes significantly influenced the consumer willingness to pay depending on the variety.

Age was positively associated with all the other four varieties, *Icirikukwai, Ebalat, SECOW* 2W and SECOW 1T except for Kenyan variety, The Hedonic pricing model suggested that consumers were willing to pay 2.5%, more for SECOW 1T, 0.9%, for *Icirikukwai*, 1.9% for *Ebalat* and 0.5% for SECOW 2W for every one year increase in age, mean while they were less willing to pay 0.2% for the Kenyan Variety for every one year increase in age. However, it was only SECOW 1T which showed significant results for age. As shown in figure.4.3, all age groups consume cowpeas except Kenyan variety which according to key informant interview with a scientist at Serere Agricultural Research Centre, and focus group discussions with traders is less consumed in the area but grown for export to neighboring Kenya, which finding is also akin to that by Adipala *et al.*, (1999) in a study on influence of farmer production goal on pest management option in eastern Uganda. These results could mean well for cowpeas since amidst the nutritional transition amongst the urban population more so the youth preferring western foods, the crop is still popular. This popularity could easily be translated in to better incomes for the producers

Household income was negatively associated with all the other five varieties, the implicit willingness to pay price being very small akin to zero. This means that as income increases, the willingness to pay for the crop decreases as is the case for inferior goods. How ever, the decrease in implicit price is negligible. This negative relationship could be pointing to

transition in consumers' behavior which should not be ignored. The possible explanation for the negative behavior for the high income class would be the fact that many families grow surviving on the crop and when their economic status changes they move to a higher indifference curve under the influence of nutritional transition. This as mentioned by Weinberger and Msuya (2004) is characterized by decline in consumption of traditional food crops, and increasing consumption of refined and processed foods, fats, sugars, and animal foods especially the urban population.

Many economists and scientist have always referred to cowpeas as pro-poor crop, for example, studies done by Dovlo *et al.*,(1976), and Langyintuo *et al.*, (2004) described cowpea (*Vigna unguiculata (L.) Walp*) as source of relatively low cost, high quality protein important in the nutrition of the poor both in rural and urban areas. Abdulai and Aubert (2003) noted that as income increases consumers tend to spend proportionately less on cereals, pulses, fruits, vegetables and more on meat, fish, and eggs, milk and milk products, as well as other foods, further confirming the negative relationship with income in this study.

Gender is positively associated with willingness to pay for all the varieties of Cowpeas. Women seem to be more associated with the crop. This could be due to the fact that women are more involved in the household food decision as reflected in table five. Women too do play major role in household shopping decision than their male counterparts as reflected in table 4.4. This finding agrees with that of Bruin *et al.*,(1994), Wang *et al.*, (1997) who found out that women were able to pay more than male respondents for recombinant Bovine Growth Hormony milk in America. Akwankwasa, (2007), also found out that women in Uganda were more willing to pay than their male counterparts for introduced banana species. All these findings are in line with previous studies by NRC, (2006), Schippers, (1997) and Lowenberg-DeBoer, (1999) confirm cowpea as an important food security crop particularly for women.

The estimated coefficients on cowpea grain color variable are all statistically significant and bear positive sign as expected except the negative sign for the case of Kenyan. Seed color was positively associated with *Ebalat*, *SECOW2W*, *SECOW1T* and *Icirikukwai* except for *Kenyan* Variety. The hedonic pricing model suggested that consumers were willing to pay 66.6%, more for *SECOW 1T*, 217.8%, for *Icirikukwai*, 230.1% for *SECOW 2W*, 232.6% for *Ebalat* for, a white to brown seed color. How ever, they were less willing to pay by 45.3% for the black seed coat color associated with the *Kenyan* variety. *Ebalat* had the highest implicit price as much as grain color is concerned. This finding is in agreement with studies in Ghana and Cameroon by Langyintuo *et al.*, (2004), where consumers there too had preference for white testa. Focus Group discussion with traders in Soroti revealed that the most popular method of cooking cowpeas in ground nut paste goes well with the white testa. The black seeded *Kenyan* variety is grown for export to Kenya.

Cowpea grain size is statistically significant in all the five samples. Consumers' were willing to pay a premium of Ug. Shillings 89, 73, 168, 200 and 148 per unit increase grain size for *Ebelat, SECOW 2W, SECOW1T, Icirikukwai* and *Kenyan* Varieties respectively. Grain size was positively associated with all the varieties. Meaning consumers did not mind

the size of the existing five varieties. This seems to be in line with studies by Wolfson *et al.*,(1989) and Kitch, *et al.*, (1998) in Cameroon indicating that large white-seeded cowpeas being more readily marketed and are typically sold at a premium, which influenced farmers decision to place about equal value on seed size and color as selection criteria as they did on grain yield.

Seed shape was negatively associated with all the varieties. The hedonic pricing model (table 4.11b)suggested that consumers were less willing to pay 39.62%, for *Kenyan*, 8.09% *SECOW 1T*, 44.75%, for *Icirikukwai*, 52.31% for *SECOW 2W* and 37.45% for *Ebalat*. As much as consumers did not think of seed shape being an important property in determining meal making suitability, the study results seem to show that the consumers may not be comfortable with the existing shape of cowpea grains.

Eye color for varieties, *Kenyan, Ebalat, SECOW 2W* and *Icirikukwai* were positively associated with the consumer's willingness to pay unlike for SECOW1T. The hedonic regression shows that, consumers were willing to pay up an additional, 18%, for *Kenyan* 37.78% for *Icirikukwai*, 11.49% for *SECOW 2W* and 76.42% for *Ebalat* and less by 13% for *SECOW 1T* with respect to eye color. *Ebalat* had the highest implicit price, which could imply it being the most preferred eye color.

Consumers were less willing to pay by 6.28% and 15.35% for *Kenyan* and *SECOW1T* mixes with others. Mixes of *ebalat, Icirikukwai* and *SECOW 2W* had positive relationship with WTP. This could be due their preference for these colors and the fact that they are all white

seeded. Mean while the black and tan color associated with the *Kenyan* and *SECOW1T* do not mix well with others and were discounted by consumers.

Consumer willingness to pay has a positive relationship with time taken to cook for *Kenyan* and *Icirikukwai*, which could mean they take shorter time to cook while that of *Ebalat*, *SECOW 2W* and *SECOW 1T* had negative relationship, meaning they take long time to cook (table 4.11b)

All the samples had positive seed making suitability relationship with consumer WTP; this implies that consumers are willing to pay a premium for all the varieties, as regards their meal making suitability. Focus group discussion with women in Kumi revealed that, all the varieties produce tasty meals.

Estimated coefficients on the damage tolerance for *Kenyan, Icirikukwai* and *SECOW 1T* had negative sign unlike *ebalat* and *SECOW 2W*. None of the coefficients are statistically significant. This suggests that consumers in eastern Uganda are less sensitive to damaged grains. Focus group discussion with women in Kumi indicated that, it is rare to find damage free cowpea; consumption of damaged cowpeas has become normal, especially during off season.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Summary

Consumer preference information is essential for targeting research to attributes desired by consumers. This study examined cowpea consumer preference and characteristics in Soroti and Kumi Districts. Up to 161 households were interviewed guided a questionnaire and Focus Group Discussions held with traders and consumers as well. Five labeled samples were presented to 161 consumers for sensory evaluations. Market prices and consumer socio-economic characteristic information were collected. Results indicate that grain size and color are the most important characteristics. The white-tan seed color command premium price in Soroti and Kumi, while the black seeded *Kenyan* type is discounted. This study indicates that quality characteristics play an important role in Ugandan food markets.

The average age of cowpea consumers reached was 37.9 years; the mean educational level for the respondents was primary seven. The respondents, on the average have five members in their family and earn monthly income of about 184, 000/= (US\$ 93.4) which translates in to daily income of 6000/= (US\$ 3.11), which is higher than the poverty line of 1US\$ a day meaning high purchasing power of the interviewed group.

Cow peas are quite popular in the study area. The percentage awareness for *Ebalat*, *SECOW* 2W and *Icirikukwai* varieties, being over 90%. To emphasize how important the crop is, over 99% stated that they do prepare a meal out of the crop and is well consumed by over 90% of
all the age groups and gender, both adult and children and consumers are well aware of all the 5 varieties of cowpeas.

Seed color is considered by 56% of the interviewed households as the most important quality factor for meal making while 39 % consider seed size as most important quality characteristics for making decision on consumption and seed suitability.

Consumers ranked *Icirikukwai* as the leading variety, followed by *Ebalat* and *SECOW 2W* (A newly introduced Variety). The black seeded *Kenyan* variety was least ranked by consumers.

The absolute difference in willingness-to-pay for the varieties is less dramatic across *Icirikukwai, Ebalat* and *SECOW 2W* and is quite distinct between these three and *Kenyan* and *SECOW 1T*. The results from the study show that consumer willingness to pay for *Ebalat, Icirikukwai* and the introduced *SECOW 2W* are not significantly (Pr(T < t) = 0.00) different from each other and that between the *Kenyan* and *SECOW 1T* were also not significantly (Pr(T < t) = 0.00) different.

Consumers would pay more for grains of *Ebalat, Icirikukwai* and *SECOW2W* if traders or producers sorted out their produce according to variety compared to what the market offered during the data collection time (Different varieties all mixed up). The market price for what was available in the market during time of study, was significantly (Pr (T < t) = 0.0000) higher than what consumers were willing to offer for pure grains of *Kenyan* and *SECOW1T*

varieties. The consumers indicated that they were willing to pay significantly (Pr (T > t) = 0.000) higher price for pure grains of *ebalat, icirikukwai* and *SECOW 2W* than the market price during time of study.

5.1 Conclusions

The adoption of foods by a population is based on a complex interaction of existing customs, availability, costs, convenience, sensory quality, and to some degree nutritional quality. Over all findings from this study have important implications for national and international institutions involved in developing new plant varieties for small scale producers. The study was conducted to find out about consumer acceptability and preference for cowpea varieties and the following are the conclusions from the study;

Consumers in eastern Uganda (Soroti and Kumi districts) have preference for white and tan testa cowpea and large seeded crop. Results show that seed color (56%) and seed size are the most important qualities consumers consider in their decision to purchase. Consumers are willing to pay a premium for white grain color, the coefficients for all the other four varieties except *Kenyan* is positive and statistically significant. The consumers were willing to pay low premium for the black seeded cowpeas.

In the study area, most consumers seem to prefer large grain size. They are willing to pay a premium of up to 200% for large seeds associated with new varieties *SECOW 2W* for unit increase in grain size. How ever local preference for small-seeded traditional cowpea varieties is apparently very strong. Consumers seem to endorse the existing grain sizes

All estimated coefficients on the damage tolerance carried negative sign. Except for *Ebalat* and *SECOW 2W*, none of the coefficients are statistically significant. Since *Ebalat* and *SECOW 2W* have the most two desired attributes of color and size, efforts to reduce damage to grain for market accessibility should be emphasized, as much as consumers seem not take seed damage for the other three varieties as a significant parameter.

The results showed that, consumers in the study area had positive attitude towards the crop. Cowpeas are important part of diet as is consumed by up to 99.4% of the households and served on important occasions (73%) and to visitors, (71%) as well. This popularity, and extensive current consumption, could translate in to a good market potential for the crop, if tapped well.

Consumers in Uganda are willing to pay a higher price for pure seeds of *Ebalat, Icirikukwai* and *SECOW 2W* and they seem to detest the *Kenyan* and *SECOW 1T*.

Low income households seem to rely more on these legumes than high income households, evidenced by a negative relationship between the income and willingness to pay for the crop. It is more cherished by women (65.84%) as they contribute more in household food decision making (55%), and it is consumed by over 90% of all the age groups. However, 1 out every 5 parents did not teach their children how to grow and prepare a meal out of the crop, an indicator of potential risk of extinction of the crop in the future.

5.2 Recommendations of the Study

These results suggest that efforts to improve upon grain size and promulgating the white seed color will be worthwhile in eastern Uganda as consumers seem to be more interested in large seeds and white seed color. Choice of grain eye color and grain cooking suitability should reflect consumers demand. That is, cowpea breeding programs for Ugandan markets should emphasize maintaining the grain cooking suitability associated with all the five existing varieties.

This study of five cowpea varieties has led to certain recommendations for producers, traders and researchers/policy markers. They point out the possibility of expanded market and growth of *Icirikukwai*, *Ebalat* and *SECOW1T* varieties. They show the need to grow and market pure crops of *Ebalat*, *Icirikukwai* and *SECOW 2W*. Any varietal development programme should take in to consideration the consumer's desire for larger seeds and the white testa color for a crop for the local market.

Basing on the study findings and conclusions, the following recommendations can be made;

- 1. A cowpea breeding programme should endeavor to breed a white testa, large seeded, cowpeas for the Ugandan market, as associated with *Ebalat and SECOW 2W*, since these were found to affect consumer acceptance and preference.
- 2. There is need for increasing awareness on the nutritional and economic value of the crop. The success of promoting cowpeas for nutritional health in Uganda will depend on strong promotional activities. Production related information, should be packaged to

include consumer preferred varieties and made available to extension personnel, progressive farmers and seed companies who may have a greater outreach to farmers.

3. Producers and traders need to select their produce in to variety specific products, for the consumers seem to be more willing to pay higher premium for a pure product as opposed to the mixed as is in today's market.

5.3 Recommendations for further Research

- 1. There is need to conduct a consumer preference study at a regional level since this crop is marketed regionally to exactly understand and compare preferences amongst regional actors.
- 2. There is need to undertake a value chain analysis study for the crop to help map all products, actors and possible products along the chain.

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APPENDIX 1- QUESTIONNAIRE

CONSUMER PREFERENCES FOR COWPEAS IN UGANDA

QUESTIONNAIRE

Enumerator: introduce your self and explain the purpose of this survey, which is to collect information on the status and use of Cowpea in the region. Please explain that all information solicited is for research purposes only.

1.0 Basic Data

| Date form filled (mm/do | l/yyyy) | | | | | |
|--|---------|---|---|---|---|---|
| Form filled at: Site 1= ; 2= ; 3= ; 4= ; 5= | 1 | 2 | 3 | 4 | 5 | 6 |

| Name of the | Parish | Name | Divisio | |
|-------------|--------|------|---------|--|
| | | of | n | |
| village/LC1 | | Town | | |

| | | | Name | of |
|----------|-------------|----|------------|----|
| Name of | Name | of | respondent | |
| H/H head | Interviewer | | | |

2.0. Demographic characteristics of the household.

| No | Names | Gender | Age | in | Relationship | | Who decides | Occupation | Income |
|-----|-------|---------|-------|----|--------------|----------|------------------|-----------------|----------|
| 1.0 | ~ | 1 =Male | vears | | to | Educatio | what food to buy | 1=Teacher | per vear |
| | | 2= | 5 | | Household | n in | at home? | 2=Trader | F J |
| | | Female | | | head. | vears | 1=Father | 3=Housewife. | |
| | | | | | 1=Husband | J | 2=Mother | 4=Manual | |
| | | | | | 2=Wife | | 3=Wife | labour | |
| | | | | | 3=Child | | 4=Husband | 5=House girl | |
| | | | | | 4=Brother | | 5=Others(Specif) | 6=Chief | |
| | | | | | 5=Sister | | | 7=Student | |
| | | | | | 6=In-law | | | 8=Unemployed. | |
| | | | | | 7=Farther | | | 9= | |
| | | | | | 8=Mother | | | Others(Specify) | |
| | | | | | 10=Others(| | | | |
| | | | | | Specify) | | | | |
| | | | | | | | | | |
| 1 | | | | | | | | | |
| | | | | | | | | | |
| 2 | | | | | | | | | |
| | | | | | | | | | |
| 3 | | | | | | | | | |
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| 4 | | | | | | | | | |
| _ | | | | | | | | | |
| 5 | | | | | | | | | |
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| 6 | | | | | | | | | |
| | | | | | | | | | |
| 1 | | | | | | | | | |
| | | | | | | | | | |

3.0 Attitude towards cowpea consumption

3.1 Do you produce a meal out of cowpea seeds?

| 0 no |
|-------------|
| 1 yes |

3.2 If yes, which seed property you consider most important for seed meal suitability? (*Tick one*)

| 1 colour 2 shape 3 size 99 other, please specify |
|---|
| 3.3 Do you offer Cowpeas when visitors come to your home? 0 no 1 yes |
| 3.4 Do you consume Cowpeas at special occasions? 0 no 1 yes |
| 3.5 Are Cowpeas an important contribution to the diet when there is food shortage? 0 no 1 yes 3.6 Do adult males in your house- hold eat Cowpeas? 0 no 1 yes |
| 3.7 Do adult females in your house- hold eat Cowpeas? 0 no 1 yes |
| 3.8 Generally, do your children like eating Cowpeas? 0 no 1 yes |
| 3.8b If No why? |
| 3.9 Are you teaching your children how to prepare Cowpeas? 0 no 1 yes |
| 3.10a Is it important to be able to identify the different varieties of cowpeas? 0 no 1 yes |

3.10b How many Varieties are you aware of?.....**3.11** Are fewer varieties of Cowpeas to be found nowadays than 5-10 years back?

| 0 | no |
|---|-----|
| 1 | yes |

4.0 Sensory Evaluations

4.1 With me, I have different types of cowpeas you might be familiar with, please have a look and answer the questions that follow.

Use the scale below;

Seed coat Color_____(5) excellent (4) good (3) fair (2) Bad (1) Very bad Seed shape_____(5) excellent (4) good (3) fair (2) Bad (1) Very bad Seed meal making suitability properties; _____5 excellent 4 good 3 fair 2 Bad 1 Very bad

Grain size, _____5 excellent 4 good 3 fair 2 Bad 1 Very bad

Grain eye color, _____5 excellent 4 good 3 fair 2 Bad 1 Very bad

Time taken for grain to cook in minutes

Acceptability_____ (5) Very acceptable (4) acceptable (3) fairly acceptable (2) Not acceptable (1) Not acceptable at all

4.2 Incase you got a grain in the market with the following characteristics which of the statements below would describe your preference?

Weevil Grain damage tolerance._____ 1 (does not tolerate), 2 tolerates (1-10%), 3 can tolerate up to (10- 20%), 5 (Not important).

Grain color mixes; Important = 0, Not important = 1

Grain size mixes; Important = 0, Not important = 1

Evaluate for me the attributes indicated in the table per sample using the above scale.

| Attribute | Sample 1 | Sample 2 | Sample 3 | Sample4 | Sample 5 |
|---|----------|----------|----------|---------|----------|
| Seed coat Color | | | | | |
| Seed shape | | | | | |
| Grain size | | | | | |
| Grain eye color | | | | | |
| Grain size mixes | | | | | |
| Grain colour mixes | | | | | |
| Time taken for grain to cook in minutes | | | | | |
| Seed meal making suitability properties | | | | | |
| Grain damage tolerance | | | | | |
| | | | | | |

| Any characteristics | additional | comments | on | tested |
|---------------------|------------|----------|----|--------|
| | | | | |
| | | | | |
| | | | | |

4.3 How much would you consume and pay for each of the samples above in Uganda Shillings if you were to buy?

| Type of | Unit Measure | Quantity | consumed | Unit price | Total cost |
|----------|--------------|----------|-----------|------------|------------|
| Cowpeas | | Amount | Unit time | | |
| | | | 1= Day | | |
| | | | 2= Weak | | |
| | | | 3=Month | | |
| | Kgs | | | | |
| Sample 1 | | | | | |
| Sample2 | Kgs | | | | |
| Sample 3 | Kgs | | | | |
| Sample 4 | Kgs | | | | |
| Sample 5 | Kgs | | | | |

5.0 Assessment of Cowpea Substitutes

5.1 How much do you consume and pay for each of the products described below in Uganda shillings?

| Type of grain | Unit Measure | Quantity | consumed | Unit price | Total cost |
|---------------|--------------|----------|-----------|------------|------------|
| | | Amount | Unit time | | |
| | | | 1= Day | | |
| | | | 2= Weak | | |
| | | | 3=Month | | |
| | Kgs | | | | |
| Beans | | | | | |
| Soya beans | Kgs | | | | |
| Pigeon peas | Kgs | | | | |
| Field peas | Kgs | | | | |
| Others | | | | | |

5.2 Which of the following best describes your preference for cowpea samples?

| Description | Sample 1 | Sample 2 | Sample 3 | Sample 4 | Sample 5 |
|-------------|----------|----------|----------|----------|----------|
| Very good | | | | | |
| Good | | | | | |
| Fair | | | | | |
| Poor | | | | | |
| Very poor | | | | | |

5.3 Based on the descriptions of the samples would you be interested in buying them if priced within your budget?

| Description | Sample 1 | Sample 2 | Sample 3 | Sample 4 | Sample 5 |
|-----------------|----------|----------|----------|----------|----------|
| | | | | | |
| Very interested | | | | | |
| Interested | | | | | |
| Not interested | | | | | |
| Not decided | | | | | |

5.4 Please tell us whether you have ever seen any of the described samples on the market (Identify them for the respondent)

| Description | | | | | |
|-----------------|----------|----------|----------|----------|----------|
| | Sample 1 | Sample 2 | Sample 3 | Sample 4 | Sample 5 |
| 1 = Aware | | | | | |
| | | | | | |
| 2=Not aware | | | | | |
| | | | | | |
| | | | | | |
| 3= Just seen it | | | | | |

| If it? | yes, | where | did | you | see |
|-----------|------|-------|-----|-----|-----|
| | | | | | |
| | | | | | |

6.0 Household income information

| 0.1. Flease tell us your sources of Cash income since this year start | . Please tell us your sources of Cash income since thi | s year started |
|--|--|----------------|
|--|--|----------------|

| Type of income | Type of activity | Period 1= Daily 2= weakly 3= monthly 4= others | Amount of income received (Ug. Sh) |
|----------------------------|------------------|--|---------------------------------------|
| Salaries/Wages | | | |
| Renting building | | | |
| Remittances | | | |
| Gifts | | | |
| Trade/profit | | | |
| Selling livestock products | | | |
| Crop produce sales | | | |
| Asset/land sales | | | |
| Land rent | | | |
| Others(Please specify) | | | |
| | | | |

6.2 Type of house as an income indicator (To be collected by the Interviewer).

| House ownership | Walls | Floor | Roof | Geographic location of the house |
|-----------------------|-----------------|----------|-----------------|--|
| 1= Renting 2=Owned | Bricks | Tiles | Iron sheets | |
| | Concrete blocks | Concrete | Grass or thatch | |
| | Mud | Mud | Tiles | |

Thank you for your collaboration!

APPENDIX 2-MARKET DATA COLLECTION TEMPLATE

Data sheet for tracking market sales of cowpea Varieties

Enumerator: introduce your self and explain the purpose of this survey, which is to collect information on the status and use of Cowpea in the region. Please explain that all information solicited is for research purposes only.

| Name of Contact trader_ | Name of |
|-------------------------|-------------|
| market | - |

| Dat e | Name of Custom er | Who buys 1= trader 2=Consum er | Variet y | Price sold/kilogra m | Quanti ty sold | Where does he/she take the cowpeas(Na me of market/zone | Commen ts |
|----------|-------------------------|---|-------------|----------------------------|-------------------|--|--------------|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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Thank you for your collaboration!

APPENDIX 3-FARM GATE DATA COLLECTION TEMPLATE Data sheet for farm gate prices of cowpea Varieties

Enumerator: introduce your self and explain the purpose of this survey, which is to collect information on the status and use of Cowpea in the region. Please explain that all information solicited is for research purposes only.

We request you provide for us information on your cowpea production and sales in the last season (August –December 2007) The following samples could help you differentiate the varieties.

| SN | Name Farmer | of | Who buys 1= trader 2=Consu mer | Varieties Grown | Quanti ty harves ted | Quantity sold | Price sold/kilogra m Ug, shillings | Where does he/she take the cowpeas(N ame of market/zon e | Any Comments ? |
|----|----------------|----|---|--------------------|-------------------------------|------------------|--|--|----------------------|
| | | | | | | | | | |
| | | | | | | | | | |
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| | | | | | | | | | |
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| | | | | | | | | | |

Thank you for your collaboration!

APPENDIX 4: MAP OF UGANDA SHOWING STUDY AREA (SOROTI AND KUMI DISTRICT)

