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Title of Best Practice: Challenges to the development of a functioning livestock marketing chain in Kenya[1]

Country: Limuru, Kiambu District, Kenya

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Category of Practice: A multi-stakeholder learning groups experience in developing a market chain for beef cattle from Massai pastoralist producers to consumers in the Nairobi

Context and Genesis

The Context of Constraints

Two thirds of Kenya is arid. This massive land surface hosts more than half or our livestock and 25% of the population almost all are pastoralists. Livestock represents our pastoralists economic and social position. Increasing pastoralist populations means increased livestock to sustain their livelihood. But this will not be possible without irreversible degradation of natural resources. Therefore there is urgent need for our pastoralists to commercialize their herds for better financial returns and livelihood. However, improved stocks will not bring desired economic benefits if marketing of livestock and their products is not improved. Prior to 1983 livestock marketing division (LMD) of Ministry of Agriculture and Kenya Meat Commission (KMC) were main buyers of our livestock. With the liberated agricultural economy these government owned institutions have ceased operation. Today livestock trade and processing is wholly in the hands of private traders and informal sector micro-enterprise. Unfortunately this change though positive has disorganized our livestock industry with consequent decline in operation capacity, quality standards and unfair trade practices. Consequently our pastoralists have been made poorer due to low prices and unfair trading. These negative impacts have completely depressed all positive development of meat industry in Kenya. However, not with standing these negative impacts the responsibility of restoring orderliness and organized livestock, trade and meat industry rests wholly with stakeholders including pastoralists.

Present Livestock Trade and Marketing Practice

Prior to 1983, the Livestock Marketing Division (LMD) in a department the Ministry of Agriculture was the main buyer of livestock. Purchased fat stock for slaughter at a government owned Kenya Meat Commission (KMC) plants at Athi River and Mombasa. Immature cattle were fattened at LMD holding grounds. LMD ceased its operations in 1983 and the trade has been left in the hands of private livestock dealers. They are doing a commendable job and providing valuable service but which carries a high risk. Government still controls the movement the movement of animals resting trade while disease control measures impede sourcing.

The marketing process starts at pastoralist level with small traders/pastoralists buying from the local community and selling on small lots at local community markets. Bigger traders buy these animals, consolidate smaller groups and trek then to main markets where the larger

[1] IFAD Supported Case Study

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traders buy and transport directly to markets in urban towns in Nairobi City for sale to butchers. In addition there are many large-scale farms with feedlots who sell their animal directly to livestock traders. Lorries are generally the common transport vehicles and transport chargers are usually high. Once landed at Nairobi slaughterhouses the animals have to be sold often in stressed conditions as there are neither holding grounds nor grazing available and markets are disorganized.

Often traders prefer to buy the poor animals at cheap price and then sell the meat product at high price. The net effect is minimal returns to livestock farmers. On average farmers get 40% of the total value. In addition this system exposes livestock farmers to untrustworthy traders. Due to lack of organized marketing many pastoralists are unable to salvage the value of their livestock when adversely affected by draught. Unless the situation is reversed by emergency intervention pastoralists who rely basically on livestock becomes destitute. There is therefore urgent need to re-organize our livestock trade. The way forward is to help livestock farmers form marketing associations. Livestock marketing associations will empower livestock farmers with market information hence knowledge of prices offered and potential buyers. This will enable pastoralists to bargain from point of strength when selling their livestock.

Genesis of Learning Practice

The position is that Kikasha Livestock (Beef) Association would wish to present a very practical case study that reflect our reality and challenges with livestock (beef) marketing chain. Our concern is that a lot of studies have been undertaken on pastoralist livestock marketing situation but no practical international are coming up. We observe that every donor (SIDA, DfID, GTZ, USAID, EU etc) have set aside funds to improve the pastoralists livelihoods and central to this effort is the livestock resource chain. For unknown reason all this goodwill is stalled. Why? And what can possibly be done to realize this goodwill?

It has been observed that 30% or more of resource value is lost due to inefficiencies in the market chain which is a bit unique and complex since it starts with poor producers (pastoralists) and ends with low income/middle class consumers but with rich middlemen as the operatives. Of course 30% loss value is too much to think about sustainable livelihood. It could be the reason why our pastoralists remain condemned to poverty. How can this situation be reversed and instead have 30% profit? Is the deep question in our minds the more we think about it the wider the "knowledge gap" gets.

Our case study focuses on grass root efforts to address this "knowledge gap" in resource management and market chain development using the learning approaches. That is exploring with all key players in the market chain the following questions:

- Where are we now? (30% loss in livestock resource value)
- Where do we want to be? (30% profit in beef resource value)
- How do we get there? (our vision, imaginative innovations of improved market chain)

The Practice

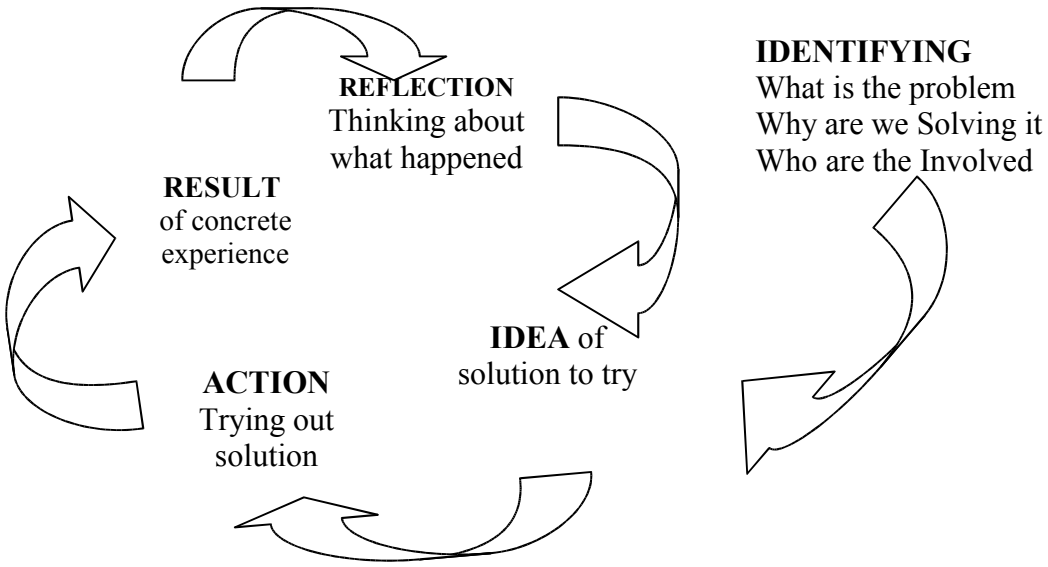
Our Beginnings as LISSA

Livestock Stakeholder Self-Help Association (LISSA) is a non-profit association of grassroot, stakeholders in our meat industry. Association was established in 1999 after a group of committed livestock stakeholders attended a seminars sponsored by Hanns Seldel Foundation and KACE discovered they shared common goals and challenges. LISSA membership comprises of pastoralists, livestock farmers, livestock traders, meat processors and butchers, who share a vision to upgrade livestock trade and meat industry in Kenya. LISSA aims to create a framework to develop new ideas and strategies to organize Kenyan livestock trade and meat industry.

The LISSA Lesson Learning Model

Our collaborative leaning model enabled stakeholders to share a 'common' vision to follow a process of 'learning-by-doing' to realize that vision. The learning entails trying out a new way of working together to address a certain issue and then reflecting together on how the new ways worked or failed. It is through reflection and the emergence of new ideas to try out that our learning initiate because a continuous process as shown in the figure below.

Figure 1. The Process of Learning



- Our Learning is a social activity. It connects us with others farmers, service providers, officials, and politicians. Learning recognizes the social aspect and use of conversation, dialogue among learners.
- Our Learning is built on what we already know. We learn in relationship to our shared vision, who we know, what we know and what we believe to be happening. It's not possible for us to generate knowledge without having some structure developed from previous knowledge to build on.
- Our Learning takes time and needs patience we have to revisit ideas, reflect on them, try them out and use them. Our Learning is a product of repeated experiences and thoughts. It takes time to sink in.
- Our Learning is a contact sport it needs to keep members interested. Motivation does not just help learning it is essential to it. Unless we know the reasons why we want to learn something we will not be very interested in carrying out the necessary actions and reflection.

How Learning has Happened in LISSA

1) Preparation of entry point for learning

The start of the learning cycle: At the Linked Local Learning workshop organised by ISG in Nyeri (Kenya) in 1998; the LISSA founder member worked together with others to understand the learning cycle; including how to get involved and the activities to undertake to work together towards a shared vision.

What was to be learned? Some members owned and managed a small abattoir in Limuru. Their challenges concerned issues of unfair trade, disorganized livestock marketing systems, poor consumers and low incomes of producers. Moreover, low returns rendered investment fragile while lack of knowledge and skill led to resources being wasted.

Why Lissa learning? Members wanted to create fair trade and better business for all members of the marketing chain. They wanted to learn how to make meat affordable to the poor and access their greatest meat market, the Nairobi city Their aim was to operationalise the meat chain to consumers in fair trade and profitable manner for benefit of all.

Who were the learners? Members organized a multi-stakeholder learning workshop for those in the meat producing chain, from pastoralists to butchers selling to customers in the Nairobi slums, at Limuru that posed these critical empowerment questions: Where are we now? Where do we want to be? How shall we get there?

2. Future Vision of New Ideas to Try Out

Where are we now? All the stakeholders attending workshop agreed that they had four main challenges: 1) disorganized livestock marketing; 2) unfair trade practices that marginalized the Maasai; 3) poor meat quality and unhygienic meat production; and 4) environmental issues including pollution from slaughter houses.

Where did they want to be? Stake holders had a future vision of fair trade among all parties including price discovery and better pricing mechanisms; empowerment of pastoralists to manage change and conserved natural rangelands; hygienic meat processing and higher quality meat and consumer satisfaction and increased trade volume from new market opportunities.

How shall we get there? They proposed to get there through partnership and co-operation between all stakeholders forming the Livestock Self-help Stakeholders Association (LISSA) to bring together pastoralists, traders, Bahati abattoir, butchers, market centre managers, and vendors. LISSA aimed to ensure fair trade practice for all concerned through price discovery.

3. Actions to Realize our Future Vision

Organized livestock marketing: LISSA members undertook to organise a market chain starting from the Maasai pastoralists through the livestock traders to the Bahati abattoir and on to the wholesale meat sellers, the retail butchers and finally to the consumers.

Fair trade practices: The Maasai in Kajiado and Narok have benefited from LISSA because today they are able to sell their livestock not for promissory notes but for cash paid on delivery! There is a system of price discovery making the prices within the market chain transparent to all the members. LISSA has been able to turn over a lot of money to the pastoralist community hence, 'poverty alleviation in the pastoralist community.'

Good meat quality and hygienic meat production: LISSA has developed innovations for hygienic processing by building a biogas plant at Bahati abattoir at converts waste from the abattoir into gas which is used for lighting and heating water for cleaning. In the LISSA

classroom regular training on hygiene; aspects of meat production and environmental issues, is conducted.

Conserving Environment: Bahati abattoir is situated next to a small lake; so environmentally acceptable waste disposal methods are essential for legal operations. The waste water used at the plant is treated through a set of ponds to ensure that it does not pollute the lake. Trees have been planted around the area to prevent soil erosion and to encourage birdlife. The sludge from the biogas plant is composted and sold to local farmers.

Assessment and Impact

The achievements have been basically that today Lissa abattoir is a most hygienic and environmentally friendly abattoir. We have got very good management and the business is increasing. LISSA as a whole has had its own challenges to be able to do fair trade. We have engaged the members to adapt some practices. We are now associated with a good name in terms of hygiene and high quality meat products. The Bahati abattoir has become a learning example for better practice to other abattoirs and stakeholders in livestock industry.

LISSA members found that the learning process was a powerful rethinking tool that transformed their problems into challenges. It demonstrated the mutual benefit of communication and information exchange both vertically to higher levels of government and industry and horizontally to peers in the livestock market chain. 'For LISSA members, learning is a contact sport of continuous engagement through multi-stakeholder meetings, individual communications, and information exchange'. Together we now push for increased livestock trade volume, higher value products and greater leverage on government policies and regulations for the livestock industry.

Benefits of the LISSA Learning Initiative

Nothing can make life more promising to poor livestock farmers than guaranteed market and price for their livestock. LISSA members committed hard work and invested their won resources into the livestock industry. LISSA meat-processing plant is a community benefit investment providing livelihood to many. Our investment provides much needed market services to pastoralists. Our abattoir has enabled pastoralists in Narok and Kajiado to realize more than 65,000 US dollars income from selling livestock. Many livelihoods have been created through the LISSA initiative and the consumers have benefited from hygienic meat production.

Against our expectation LISSA has been become service provider for training and technology development to other abattoirs. It's refund case for community of service (private sector) initiative to organise meat industry. LISSA evolved into greater association of abattoirs in Kiambu and Kajiado District called KIKASHA.

Limitations of the LISSA Learning Initiative

Failure to access and harness information and technology is our greatest impediment. Yet meat processing is a technical enterprise. Lack of critical product processing technical know how has led to income and resource wastage. In effect, we urgently need participatory technology development to exploit viable technologies capable of raising meat enterprises productivity. It is evident we have been doing something. On the ground we have capabilities and assets including material and social resources that are ripe for development. Unfortunately, we lack the financial resources to undertake technology development and adaptation. Our greatest problem is how we can link our meagre resources and investments

with formal Extension and Research so that improving our meat micro-enterprise is best served by our energies and creativity. We strongly believe a participatory technology development process can help. We are currently seeking a partnership between LISSA, the University of Nairobi and the Kenya Meat Institute.

Factors Contributing to Success and Failures

The critical factor to LISSA learning initiative was the shared vision. The other major factor that contributed to success was LISSA learning in practice where members could immediately see the results of their learning. Most important aspect was the learning was coordinated by a motivated learning champion on the spot who kept the group spirits high never giving up even in times of hardship. The availability of energetic community of service (Private Sector) operating at Bahati abattoir contributed to the success of LISSA learning initiative. ISG provided very essential backstopping to LISSA learning initiative that kept the group active with new tools (information) to resolve problems and linking potential funding agencies. LISSA is an active member of the "Linked Local Learning" initiative for demand driven services in East Africa. Association coordinator attended learning workshops on Demand Driven Services organised by ISG. LISSA's own training workshop greatly motivated members as new knowledge give them faith in their vision.

Opportunities for Mainstreaming and Scaling-Up

LISSA has evolved in to bigger association called Kikasha. This evolution happened during a learning exchange visit by representatives of other abattoirs from Kajiado and Kiambu Districts. The visit was organized by PSDA, a GTZ project, to help other abattoirs learn of LISSA's experiences and innovations. After the visit all agreed to form a bigger Association help mainstream and scale up the LISSA vision for better meat industry and adopt the innovations for benefit of all involved in the livestock marketing chain.

The new Association (KIKASHA) has adopted LISSA's learning model and practices. Already it has successfully organized a training course on hygienic meat processing for Kajiado abattoir. This was supported by PSDA and great improvement has been recorded. The Association has plans to start a Telecentre for information sharing and knowledge management for meat industry stakeholders. The telecentre would allow us to bring many more abattoirs and other livestock stakeholders into our learning model. There is great potential for scaling up the learning practice with great benefits to all stakeholders including pastoralists. The envisaged information and knowledge sharing between many more stakeholders will add value in the livestock market chain.

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Title of Best Practice: Strengthening Market-Orientation of Agricultural Research in Low-Income Countries Using Sorghum as an Example[3]

Country: Lake Zone, Tanzania

Authors: January M. Mafuru, Seperatus P. Kamuntu[4] and David W. Norman[5].

Context and Genesis

Sorghum is the second most important cereal crop and a major source of income for many poor farming households in the semi-arid areas of Tanzania. In areas of low and unreliable rainfall, there is a growing recognition that sorghum is superior to maize in providing for food security. Therefore, there is increasing recognition of the importance of encouraging farmers to grow sorghum in drought-prone areas. In Tanzania, farmers grow sorghum mainly as food to prepare *ugali* (stiff porridge), *uji* (soft porridge) and a malting local brew. Despite its importance in facilitating household food security, the production of sorghum has been declining over time, while production of maize has increased even in drier areas. The change in consumer preferences towards maize meal has reduced the importance of sorghum as far as production decisions of farmers are concerned except when household food security is at risk.

In Tanzania, sorghum research has been conducted by government institutions in collaboration with regional and international research organizations, in an effort to develop appropriate improved sorghum technologies for smallholder farmers. To date eight improved sorghum varieties have been released, together with associated agronomic recommendations. Despite such achievements sorghum farmers still grow local varieties, while the adoption of improved varieties is generally low. As a result of the introduction of FSA in the 1990s breeders have incorporated quality characteristics that farmers demand. Since the mid 1990s farmers have participated in variety development experiments through on-farm research trials. Breeding programs have focused on developing varieties that are resistant to production constraints (i.e., including disease, *striga* and drought), which vary by production season and agro-ecological zone. However, sorghum research activities have not adequately addressed quality attributes demanded by sorghum consumers in the market place. Therefore, most of the sorghum produced is consumed by farm households themselves.

The production of sorghum has been characterized by a lack of use of purchased inputs partly due to the absence of rural credit and marketing services. In addition sorghum utilization has largely been limited to the traditional food products such as *ugali*, *uji* and local brews. There have been limited processing and/or value adding activities due to either a lack of appropriate technologies and/or suitable sorghum varieties. The absence of value adding activities has made sorghum less competitive in the manufacturing and livestock feed industries. One way the sorghum industry could effectively compete with the maize sector is in the development of value-added products through strong linkages with the key stakeholders in the sorghum sub-sector. The non-utilization of improved technologies and poor linkages between producers, processors and consumers, are partly responsible for the inferior status of sorghum in the country. There is either a lack of awareness concerning existing technologies or when such technologies do exist, they are either not suitable for the production environments farmers

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face or they are not appropriate for direct utilization by processors who demand specific crop attributes in order to produce value-added products. The lack of effective collaboration among the key actors (i.e., research institutes, NGOs, extension services, farmer associations, traders and processors) has undoubtedly been responsible for the limited use of improved varieties in developing value-added products.

The Practice

Objective

The overall objective of the research approach or practice was to determine the potential adoption of improved sorghum varieties, by integrating the production and consumption characteristics preferred by farmers and consumers in the Lake Zone of Tanzania. Previous sorghum research efforts have focused on farm level analysis with little emphasis on characteristics of varieties demanded by consumers in the market place. Although sorghum is produced mainly for the purpose of attaining household food self-sufficiency, improving its marketable qualities could potentially enhance the adoption of new varieties and their associated technologies. Furthermore, since the mid 1980s, Tanzania has carried out major economic reforms particularly focusing on market liberalization, which have influenced farmers' production decisions. Structural Adjustment Programs (SAPs) and the associated removal of production subsidies have necessitated farmers' concentrating most of their limited resources on crops that are profitable. This implies that farmers now respond more to market incentives than was the case prior to market liberalization. Numerous studies have shown that consumers prefer specific variety attributes (Ndjeunga and Nelson, 2005). On the other hand, market information has been found to be important in farmers' decisions to adopt new technologies (Negatu and Parkish, 1999). Therefore, providing targeted market information concerning specific needs of the consumers would help farmers to make informed production decisions.

This case study discusses the application of a sub-sector approach (SSA) in evaluating five sorghum varieties (i.e., three improved and two local) in the Lake Zone. This approach was used in combination with FSA, which is currently widely applied in Tanzania. The case study involved evaluating the sorghum varieties across different production environments as is normally the case in applying FSA. Then the varieties were evaluated by producers (i.e., farmers) and consumers to elicit their preferences. Finally, the adoption of these varieties by farmers in the study area was predicted using an ordered probit model. The study used in-depth and focused group interviews to collect the required information, which was later analyzed using various parametric tools.

The Concept of a Sub-Sector Approach

A sub-sector is defined as a vertically integrated group of enterprises that deal with the same product(s) (Shaffer, 1973). It includes enterprises that produce and/or procure the raw materials, as well as process and sell the final product to end-users. In agriculture, the food systems matrix consists of a horizontal and vertical dimension (Boughton *et al.,* 1995). The horizontal dimension refers to firms within a particular industry where production functions are performed. The vertical dimension comprises of a subsystem (i.e., sub-sector) of single commodities where different production, assembly, processing and distribution functions are performed (Figure 1).

Since the mid 1980s, many agricultural research institutions in low-income countries have adopted the FSA. This has resulted in greater emphasis on farm level systems analysis (i.e., horizontal orientation) but there has been less attention on the interrelationships among the

different stages in the vertical dimension of the food system matrix (Boughton *et al*., 1995). Therefore, in the agricultural sector the productivity of the food system has remained low, because small-scale farmers have adopted little in the way of improved technologies. Thus a SSA has been advocated as a complement to current farm-focused research approaches.

Figure 1: Food Systems (Agricultural Sector) Matrix

PRODUCTION AND DISTRIBUTION FUNCTIONS	**SUBSECTORS**				
	Sorghum	Millet	Maize	Cotton	……
Input Distribution	**SUBSECTOR** / **APPROACH**				
Farm–Level Production		**------- FARMING SYSTEMS APPROACH ----→**			
Processing					
Storage					
Transportation					
Marketing					
Consumption					

Source: Boughton *et al*. (1995)

What was Done

To analyze the sorghum sub-sector, four steps were followed. First, five sorghum varieties were evaluated at farm level through on-farm trials. The performance of the varieties across different production environments was evaluated using adaptability analysis. Then farmer preferences for the five varieties were elicited through farmer interviews. The third step involved elicitation of consumer preferences of sorghum *ugali*. Finally, the information obtained from steps one through three were combined using the conjoint design technique to obtain variety profiles, which were later ranked by farmers to predict adoption. The analytical tools together with types and sources of data were as follows:

- *Adaptability Analysis.* Adaptability analysis (formerly modified stability analysis) was applied in this study to evaluate the performance of sorghum varieties across different production environments in the study area. The method involved regressing the yield of each variety at each site against the mean yield of all varieties at each site (Hildebrand and Russell, 1996). The mean yield represents a type of environmental index. Using the estimated regression coefficients, sorghum varieties were evaluated on the basis of their performance and improved varieties were compared with the local varieties under different production conditions. The following regression model was used to estimate the performance of the different sorghum varieties across production environments (Hildebrand and Russell, 1996; Sall *et al*., 1998).

$$Y_{ikj} = \alpha_0 + b_1 Z_j + b_2 X_i + b_3 Z_j X_i + \varepsilon_{ij} \quad (1)$$

  Where: Y_{ikj} = yield of improved variety *i* and the local variety *k* at location *j,*
  Z_j = the average yield of all varieties at location *j,*
  X_i = a dummy variable that takes the value 1 for the improved variety, and 0 otherwise.

  In addition determinants of good production environments were examined using Tobit analysis.
- *Preferences of Sorghum Varieties.* We applied conjoint analysis to determine farmers' and consumers' perceptions of variety performance, and level of acceptance. Conjoint

analysis is a multivariate technique used to estimate how respondents develop preferences for products or services (Hair *et al.,* 1998). Unlike matrix ranking and/or scoring which are usually applied in FSA we used parametric analyses to check the consistency of farmers' and consumers' preferences with respect to their utility functions (Equation 2).

$$R_j = a_0 + \sum_{i=1}^{N}\sum_{l=1}^{3} b_{il} r_{il} + \varepsilon_i \qquad (2)$$

Where: R_j is the ranking evaluation of the farmer for a sorghum variety j with production/consumption characteristics (attributes) I,
a is an additive constant,
r_i is the perception (i.e., defined in terms of 3 levels l) of variety attribute I,
$b_{il}'s$ are the part-worth utilities for the 3 levels ($l's$) of each of different attributes ($i's$) of the j[th] variety, and
ε_i is a normally distributed error term.

Each level of attribute may have a different part-worth utility. Consequently we assumed each farmer/consumer adds the individual part-worth utilities to evaluate the overall utility of each sorghum variety. This formulation suggests that respondents' ratings are an additive function of the "true" but unknown part-worth utilities.

In addition we computed the relative importance of variety characteristics in the respondents' preference ranking. Relative importance is the value that indicates how important one variety attribute is relative to all other attributes. The relative importance value is critical for designing research and development strategies that might be needed to enhance acceptability of the varieties by respondents. We calculated relative importance values by first calculating the range for each attribute by taking the difference between the maximum and minimum estimated part-worth of that attribute. Then we computed the sum of the ranges over all attributes. The relative importance (RI) of an attribute i was obtained as follows:

$$RI = \left[\frac{Utility\ \ Range\ for\ \ Attribute_i}{\sum_{i=1}^{N} Utility\ \ Range\ for\ all\ \ Attributes} \right] * 100 \qquad (3)$$

- *Ex-Ante Adoption Analysis*. To determine adoption of sorghum varieties we used the concept of derived demand. The concept is based on the premise that farmers adopt the new varieties if there is an effective demand along the vertical orientation of the food matrix (i.e., production by farmers to be purchased by consumers in the market place). Since sorghum production is also affected by biophysical and socioeconomic (i.e., production) conditions experienced by farmers, performance of the varieties was also evaluated in terms of farmer and consumer preference. Using Lancesterian demand theory, we described sorghum varieties in terms of their production and consumption characteristics. The theoretical model used in this analysis was formulated as follows:

$$V_{(G)} = b_0 + b_1 A_i + \ldots + b_k Q_k + b_p P_G + \varepsilon_i \qquad (4)$$

Where: $V_{(G)}$ is an indirect utility (preference) obtained from each variety,
$b's$ are the marginal utilities (part-worth) to be estimated,

A is a vector of variety production attributes, and
Q is a vector of variety quality (consumption) attributes.

From consumer theory, price (P_G) is a function of individual income and demand shifters such as taste and preference (in this case variety attributes). However, in conjoint analysis price is considered as one of the attributes, which affects consumers' decision-making (Green, 2003).

The empirical function used to estimate the adoption potential of the varieties was an ordered probit model (Equation 5).

$$V_{ij} = \beta' x_i + \varepsilon_i \quad (5)$$

Where: V_{ij} is a latent and continuous measure of preference ranking,
x_i is a vector of variety attributes,
ß is a vector of parameters to be estimated,
ε_i is a random error term.

Data for the *adaptability analysis* was obtained from agronomic trials conducted on farmers' fields in two agro-ecological zones in the Lake Zone Tanzania. Farmers compared the performance of five sorghum varieties; three improved (Tegemeo, Pato, Macia) and two local (Weigita and Gudungu) on their farms. The two agro-ecological zones are characterized by low (<600mm) and medium (600-1000mm) annual rainfall, and are the main areas for sorghum production in the Lake Zone. Data for determinant analysis included yield, amount of rainfall, soil nutrients, soil type and farmers' management practices.

Data for farmers' *preference analysis* were collected by interviewing farmers who participated in the agronomic trials. Prior to trial establishment, focus group interviews were conducted to identify sorghum characteristics which farmers use to evaluate new sorghum varieties. These characteristics were included in the questionnaire, in which farmers were asked to rate the performance of each characteristic in each variety according to their perceptions. Then they were asked to rank the variety according to their overall preferences from one to five (i.e., one implies most preferred). An analogous methodology was used in consumer preferences. Consumers evaluated six *ugali* samples in which five were prepared from flour obtained from undehulled sorghum varieties. The sixth *ugali* was prepared from a mixture of local sorghum and cassava flour. In both cases two price levels were added to evaluate the effect of price on farmer/consumer preferences.

To predict *ex-ante adoption* of the varieties, orthogonal plans describing the different sorghum variety profiles were generated using the conjoint design technique. A sample of 100 farmers selected from two villages was asked to rank the different variety profiles according to their preference. An ordered probit model (Equation 5) was used to determine potential adoption of these varieties.

Table 1. Results of Sorghum Sub-Sector Analysis

Variety Name	Farm Level Analyses		Consumer Preference Analysis	Predicted Adoption	Recommendations
	Adaptability	Farmer Preference			
Macia	-Without fertilizer it was superior to local varieties under low rainfall but inferior to local in high rainfall -With fertilizer inferior to local varieties under low rainfall, but superior in high rainfall	Ranked first by farmers. ***Accepted attributes***: early maturity, high yield, high tolerance to drought and Medium tolerance to bird attack ***Rejected attributes***: None	Ranked first by all consumers. ***Accepted attributes***: Color, taste, texture and aroma ***Rejected attributes***: None	FSA- 56% SSA-80%	Promote for production, home consumption and marketing
Tegemeo	-With fertilizer it was superior to local varieties across all levels of rainfall -With fertilizer inferior to local varieties under low rainfall, but superior under high rainfall	Ranked second by farmers. ***Accepted attributes***: yield, tolerance to drought and bird attack, and medium maturity. ***Rejected attributes***: None	Ranked second by all consumers. ***Accepted attributes***: Color, taste, texture and aroma ***Rejected attributes***: None	FSA-56% SSA-80%	Promote for production, home consumption and marketing
Pato	-Without fertilizer it was inferior to local varieties under low rainfall, but superior under high rainfall. Similar results for fertilized fields.	Ranked fourth by farmers. ***Accepted attributes***: yield, medium maturity and medium tolerance to drought. ***Rejected attributes***: susceptible to bird attack	Ranked third by urban consumers, ranked fourth by rural consumers. ***Accepted attributes***: Taste, texture and aroma ***Rejected Attributes***: Color	FSA-16% SSA-11%	-Reduce susceptibility to bird; -Improve color
Gudungu	-When unfertilized it was superior to Pato but inferior to Macia in low rainfall areas. Inferior to Pato but superior to Macia in high rainfall areas. It was inferior to Tegemeo across all levels of rainfall -With fertilizer it was superior to all improved varieties in low rainfall areas, but inferior in high rainfall areas .	Ranked third by farmers. ***Accepted attributes***: yield, medium maturity, tolerance to bird and drought ***Rejected attributes***: None	Ranked fourth by urban consumers, ranked fifth by rural consumers. ***Accepted attributes***: Color, texture and aroma ***Rejected attributes***: Taste	FSA-56% SSA-12%	-Improve taste
Weigita	-When unfertilized it was superior to Tegemeo and Pato in low rainfall areas, but inferior to both varieties in high rainfall. It was inferior to Macia in low rainfall areas, but superior in high rainfall. -When fertilized it was superior to all varieties in low rainfall, but inferior in high rainfall.	Ranked fifth by farmers ***Accepted attributes***: yield, tolerance to bird attack and tolerance to drought ***Rejected attributes***: Long maturity	Ranked fifth by all consumers ***Accepted attributes***: Texture and aroma ***Rejected attributes***: Color and taste	FSA-21% SSA-15%	-Reduce its maturity. -Improve color and taste.

Source: Mafuru (2005).

Assessment and Impact

Space constraints do not permit a detailed discussion on all the results from the case study – see Mafuru (2005) for much more information on the results. Therefore, the results for each variety are briefly summarized in Table 1. In general, from both the producer and consumer viewpoints, two of the improved varieties (i.e., Macia and Tegemo) were better than the other three varieties.

It was found that in farmers' overall preference ranking of the varieties, length to maturity contributed 42.6%, tolerance to bird attack contributed 27.5% and tolerance to drought contributed 15.1%. Yield and price of sorghum seed contributed 3.5% and 11.4 % respectively. Although yield was less important in farmers' ranking, low yielding varieties were less preferred. In consumer preference analysis, the results indicated that colour of sorghum *ugali* was the most important attribute considered by consumers when ranking their preferences. It was found that on average colour of *ugali* contributed 24.8% in overall preference ranking; and taste was the second most important attribute contributing 18.5%. Price of a plate of sorghum *ugali* contributed 13.9% while stickiness on touch contributed 10%. Softness of *ugali* was less important in consumer preference ranking.

For farmers' preference ranking, most respondents indicated that they preferred a short (early) maturing variety and a variety with medium tolerance to bird attack, and high tolerance to drought. On the other hand, consumers indicated that they preferred *ugali* with white or khaki colour. Red or brown coloured sorghum was not preferred except in one region (i.e., Mara) where red colour was much more preferred. Most respondents preferred a slightly sweet or neutral *ugali* taste while a bitter taste was less preferred. The results indicate that farmers and consumers have preferences concerning specific variety attributes, which are important in them deciding whether or not to accept specific sorghum varieties. Therefore, availability to producers of information on variety characteristics preferred by consumers is likely to enhance the adoption by farmers of those varieties that have the preferred characteristics.

Factors Contributing to Potential Success

Findings from the sub-sector analysis of the sorghum varieties examined indicated that two of the improved varieties -- Macia and Tegemeo – in general appeared to be preferred by both producers and consumers over the other improved variety (i.e., Pato) and the two traditional varieties (i.e., Gudungu and Weigita). Therefore promoting the Macia and Tegemeo varieties is likely to be potentially most successful in terms of enhancing production, home consumption and boosting marketing of sorghum. Promotion strategies are likely to be needed for this to occur. These could be facilitated by wider tasting of *ugali* prepared from these varieties as well as indicating to farmers the acceptability of these varieties by both rural and urban consumers. Increased production of these varieties will also need to be promoted through ensuring farmers use appropriate techniques by making sure adequate soil moisture conditions are created/exist and fertilizer is applied. In addition, it could be useful to undertake benefit-cost analysis relating to the production and processing of these varieties in order to promote entrepreneurship on the part of farmers and other key players in the sorghum sub sector. For varieties which were less acceptable, there may be potential payoff from improving those characteristics (attributes) which were not acceptable.

Opportunities for Mainstreaming and Scaling-Up

A farm-focused analysis approach, as currently implemented under FSA was an important first step in improving the potential adoption of new sorghum varieties, through taking into account farmer preferences. However, the application of a SSA that also takes into account the views of the end users (i.e., consumers) could encourage higher adoption rates, because of the potential return from marketing some of the production. Acceptance of *ugali* from Macia and Tegemeo by consumers implies a potential market for those varieties. Hence application of SSA potentially helps improves understanding on where, when and what actions need to be taken to promote acceptability of technologies generated by research organizations. Since the SSA covers everyone from the producer to the consumer, strategies need to be developed to ensure active participation of the key stakeholders. This is a challenge that still needs to be institutionalized particularly in national agricultural research systems (NARS) in low income countries. A starting point could be building on foundations developed through participatory approaches that evolved from the FSA which involved farmers in breeding and selection of varieties – for example, beans in Rwanda (Sperling and Berkowitz, 1994) and rice in Nepal (Sthapit et al, 1996). In this era of increasing globalisation and commercialisation of agriculture, a failure to adopt the SSA involving both farmers and consumers is likely to lead to increased marginalisation and decreased support for, and relevance of, research organisations in low-income countries.

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