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DEVELOPMENT OF A BDS MARKET FOR AGRICULTURAL INPUTS IN RURAL UGANDA

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DEVELOPMENT OF A BDS MARKET FOR AGRICULTURAL INPUTS IN RURAL UGANDA: IMPACT ASSESSMENT OF AT UGANDA PROJECT “FACILITATING AGRICULTURAL INPUT DISTRIBUTION LINKAGES”

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EXECUTIVE SUMMARY

Overview of the BDS Study

This study of Business Development Services (BDS) in Uganda is part of a broader study, supported by USAID/EGAT/MDD, to explore the contributions of the BDS market development approach to strengthening micro- and small enterprises (MSEs) and to the amelioration of poverty. The research reported here is centered on a USAID-funded project implemented by AT Uganda Ltd. entitled *Facilitating Agricultural Input Distribution Linkages*. The AT Uganda project was designed to assist the agricultural input distribution sector by strengthening the linkages among large-scale distributors, stockists (small-scale retailers), and farmers. It focused on assisting stockists who sell agricultural inputs to farmers to play a stronger role in providing other business services related to agricultural production and marketing.

This report summarizes the change in the business situation of Ugandan stockists and farmers who were surveyed in the Mbale and Masindi districts where AT Uganda's project was implemented. The research was carried out in two stages. The initial phase of this research took place in October, 2003. In November, 2006, the field research team replicated the 2003 study. Three groups within Uganda's agricultural supply chain took part in this study: 1) Large and medium scale agricultural suppliers and distributors; 2) Small-scale agricultural input retailers (stockists); and 3) Farmers.

The AT Uganda *Facilitating Agricultural Input Distribution Linkages* Project

The AT Uganda project studied here, *Facilitating Agricultural Input Distribution Linkages*, worked in the districts of Mbale and Masindi in central and eastern Uganda. It focused on facilitating linkages to input supply and other BDS services rather than supplying inputs and services directly to stockists (small shopkeepers) or farmers. This approach was designed to inspire demand for agricultural inputs through an integrated set of activities including training stockists in business management, supporting demonstration plots run by stockists, and educating farmers. The project's objectives were 1) Management capacity of rural retailers in project area enhanced; 2) Demand for agricultural inputs in project area increased; 3) Rural retailer access to credit enhanced on a sustainable commercial basis; 4) Donor distortions in the input market reduced; and 5) Farmer access to market information improved.

The projects' central components included

- **Training.** Stockists were offered the opportunity to purchase training from private service providers. The trainings were designed to strengthen stockists' capacity to manage their business (advertising, marketing, and bookkeeping) as well as to enable them to better serve the farmers residing around them with various inputs (seed varieties, fertilizers, herbicides, use of certain tools, and the knowledge of how to use these well).
- **Inciting Demand for Inputs.** Media and education campaigns (focused on informing farmers about various inputs and the location of participating rural stockists who could supply them) and demonstration plots run by stockists were used to inform farmers and inspire them to purchase and use inputs
- **Market Access.** The project facilitated linkages between the stockists and existing sources of market information and sent stockists a weekly newsletter with the latest price and outlet information. The project also established links between the Ugandan Grain Traders Limited and the stockists in order to assist stockists to buy farmers' produce after harvest.

- Credit Linkages. Shortly after the initial phase of the research, AT Uganda began a credit guarantee program. This program helped participating stockists function as a solidarity group for a 60-day suppliers' credit. This was done to make it more attractive for large-scale suppliers to provide credit for stockists' purchases.

The project performance targets were 1) 250 rural retail micro-enterprises benefiting from the program by end of project; 2) 30% female owned retailers by end of project; 3) 25% of distributor sales in the program area made through rural retailers by end of project, and 4) Annual input sales in the program area valued at \$1,000,000 by end of project. Based on these objectives and indicators, the project was judged to be successful.

Research Methodology

The two phases of this longitudinal study, which was conducted through quantitative questionnaires, semi-structured in-depth interviews, focus group discussions and observations, took place in 1) October and November of 2003 and 2) November and December of 2006. The results from the initial phase of the research provided the baseline and basis for assessing changes due to the project for the final report. The research team that ran the initial phase of the study in 2003 had some problems in targeting stockists and farmers to be interviewed. While the interviews that they conducted were of good quality, the coverage in the area of interest was limited. The team for the second phase of the research retargeted the work, re-interviewing stockists and farmers where possible. The qualitative and quantitative survey instruments were redesigned to include retrospective questions to allow for filling in gaps for stockists and farmers who had not been surveyed before and to allow for triangulating the information from the 2003 research.

Quantitative Data Collection

Stockists. In 2003, 144 stockists were interviewed in Mbale, Masindi and Kampala. In 2006, 72 stockists were interviewed in Mbale and Masindi. Experimental respondents were selected from the list of stockists who had participated in AT Uganda project trainings and/or the project's credit guarantee program ("experimental group stockists"). They were selected for interviews based on 2 criteria: 1) whether they had been interviewed in 2003 and 2) location. For the control group, comparable stockists were then sought within the pre-identified counties.

Farmers. In 2003, 349 farmers were interviewed. In 2006, 153 farmers were interviewed in the expected catchment areas of a sub-sample of the interviewed stockists. Ninety-three of these were part of the original sample and 60 were added to assure proper overlap with the stockist sample. The farmers who shopped with a stockist who had participated in the AT Uganda project were defined as the experimental group. Farmers who purchased their inputs elsewhere were categorized as the control group.

Large Scale Seed Producers and Wholesale Distributors. These businesses were selected based on the role that they play in supplying inputs to the stockists in the study area. Staff from three seed producers and 10 wholesale input suppliers and/or input distributors were interviewed.

Qualitative Data Collection

In both 2003 and 2006, the research team conducted in-depth semi-structured interviews with large scale producers and suppliers, stockists and farmers. In both years, they also conducted and focus group discussions with stockists and farmers.

Considerations in Interpreting the Data

- *Study Period and Project Period.* The initial study was carried out after the project had already begun, so it is not a true baseline. However, because some project impacts necessarily have a time lag (e.g., because of the time between planting and harvesting and the time between purchasing an inventory and selling it), this has likely not made a substantive difference. On the other hand, there is little or no time lag for some impacts (such as the time between learning a new skill and applying it). Because the follow-up study was carried out well after the project had been completed, it measures some elements of the sustainability of project impacts beyond the life of the project.
- *Lag Time between Agricultural Input Purchases and Earnings at Harvest.* Farmers were asked about agricultural input expenses over the previous month, agricultural season, and year. Because agricultural cycles are long, sales after harvest are not always captured in the same time period as the expenses. Changes in earnings by farmers who recently made significant changes in their input purchasing practices may not have been captured here.
- *Wide Variation in Data.* There was very high variation in the data, particularly in data on costs and sales, which were not always normally distributed. Where necessary, statistical considerations were used to select appropriate sub-sample slices of data to test specific hypotheses. Non-parametric tests were run where appropriate.
- *Adjusting for Inflation.* The official overall inflation rate for Uganda between 2003 and 2006 was 18.6%, so the 2003 cost and sales data were adjusted for inflation to allow for more realistic comparison. However, agricultural input prices and agricultural product prices may not have changed at the same rate as overall inflation in Uganda. In cases where the significance of a finding might be affected by whether or not an inflation adjustment was made, both figures are included for comparison.
- *Reporting in \$US.* The Ugandan Shilling to US dollar exchange rate at the time of the 2006 survey was .0005525. For ease of interpretation by a wider audience, sales and expenditures have been converted to US dollars.
- *Estimated and Calculated Costs and Sales.* Stockists were asked about their sales and expenses in three ways. Since very few stockists kept records of their sales, they were asked to 1) *estimate* their *overall* sales and costs over the previous *two agricultural seasons* (one agricultural year); 2) *calculate* how much they earned on sales of each specific input during the *present agricultural season*; and 3) *calculate* what they spent to purchase their inventories (whether sold or not) over the *past two seasons*. The calculated sales and costs may be assumed to be a more accurate reflection of their agricultural inputs business than their estimated overall sales and costs. However, the estimated sales and costs are necessary because farmers have different cropping patterns during the year's two agricultural seasons. Where the figures for the season and the 12 month period do not concur, both are reported.
- *Complex relationship among sales, cost of inventory, and profit.* The cost (and, subsequently, the profit) figures in this report may be misleading. The 2006 cost value of agricultural inputs purchased is the amount spent on the stockists' inventory. "Sales" minus "cost value of inputs" is not the same as the profit margin over the sales price of goods sold. In addition, operating costs were not included in the calculations. However, in most cases, it is the relationship of these figures across time and across the control and experimental groups that is of interest rather than the ostensible numbers themselves.

Context for the Findings

Agro-economy. Poverty and market isolation are central factors affecting farmers and the stockists who sell them inputs. In 2003, the per capita income of Ugandans was \$330, with 9.5 million people living on less than a dollar a day. In 2002, 38% of Ugandans lived below the poverty level.¹ Ninety-six percent of all farmers surveyed said that they would have wanted to use more purchased inputs than they did. Fifty-eight percent said that they could not purchase additional inputs because they did not have enough cash available when inputs were needed, and 47% of farmers said that they can't afford to buy additional inputs (don't ever have the cash) at all. While this has to do with poverty in general, it is also related to the lack of effective markets for the crops that farmers are able to produce.

Large-Scale Distributors and Seed Producers. Most stockists purchase their inputs from seed producers and input wholesalers and distributors, and the project also worked with these businesses to improve their support to stockists. The thirteen large-scale business that were surveyed characterized their customer base as including a) stockists from peri-urban, urban, and rural areas (an average of 57% of their customers were rural), b) farmers, including commercial farmers, small farmers and farmers' groups (31%), and c) NGOs (12%).

Stockists. In addition to the seeds, agrochemicals and small tools that they offer for sale, stockists mentioned offering the following services: advice about inputs use, credit to 'trusted customers,' training to farmers through demonstration plots, discounts on [new] products, purchase of farmers' products, information about prices for farm produce and livestock as well as about places to market goods, formal training, and printed information.

Farmers. Farmers in Mbale and Masindi tend to have highly diversified crop mixes. Crops that surveyed farmers mentioned growing include (in order of frequency mentioned) maize, beans, cassava, sweet potato, groundnuts (peanuts), banana and plantain, finger millet, coffee, tomatoes, onions, sunflowers, cabbages, soy beans, Irish potatoes, sorghum, rice, sugar cane, leafy greens, trees fruits, cotton, pigeon peas, tobacco, and pineapple. Most farmers buy seeds, but relatively few buy pesticides, fertilizers or herbicides.

Poverty and Markets. At the root of stockists' earnings is farmers' ability to pay to purchase inputs from them. And at the root of farmers' ability to pay is their ability to earn income from the sales of their crops. While the project's credit guarantee program helped stockists have increased access to capital to purchase inputs, and at the same time allowed them breathing room to provide informal credit to farmers, farmer ability to pay for inputs continues to be a barrier to increased input sales. This poverty seems to color all aspects of this area of the value chain.

Both stockists and large-scale suppliers noted that farmers are reluctant to increase their spending on inputs when they see few prospects for increased earnings from sales. Part of this has to do with the level to which farm families quite simply subsist on what their farm produces: 22% of farmers surveyed report that they consume 76-100% of their farm products within the household. Farmers who are lower resourced appear to be less able to take advantage of the informational and educational resources that BDS-trained stockists can offer. While the project did encourage stockists to function as middlemen and to purchase farmer harvests, it did not appear that many stockists or farmers did this.

The primary drag on improving the profits of both stockists and farmers continues to be farmer poverty, which itself appears to be linked to farmers' limited options for selling their products. This poverty, and the structures that maintain it, appear to be so entrenched that Business Development Services, while clearly appreciated by both stockists and farmers, may be, by themselves, insufficient to significantly improve the profits of stockists and farmers in this region of Uganda.

¹ USAID. Budget: Uganda. <http://www.usaid.gov/policy/budget/cnj2005/afr/ug/html>. (accessed May 30, 2007).

Findings

The following is a summary of the main results of the hypothesis testing for the stockists and farmers who responded to our questionnaires along with overall considerations arising from the analysis.

Stockist Results: Impacts of the AT Uganda BDS Project

Impacts of BDS Training

- Stockists who participated in AT Uganda BDS trainings
 - offered a wider variety of services than those who did not participate in BDS trainings
 - did not have significantly higher sales of agricultural inputs than stockists who did not participate in BDS trainings
 - had significantly higher costs, both for the first season of 2006 and for the entire year
 - did not have significantly more customers than those not trained in BDS
- The more BDS trainings a stockist received,
 - the lower his or her overall yearly 2006 sales were likely to be
 - the lower his or her change in overall yearly sales since 2003 were likely to be²

Access to Credit

- Significantly more stockists who participated in BDS trainings accessed credit of any type (through the credit guarantee program sponsored by the project, formal credit, or informal credit from suppliers) than did non-participating stockists.
- For stockists who did access credit, the greater the stockists' initial 2003 income from sales, the greater the amount of credit that they used.

Impacts of Demographics on Stockist Business Patterns

- Shop owners between the ages of 36 and 47 have significantly greater increase in overall yearly sales than older stockists.
- Shop owners with higher levels of education did not have greater increases in sales between 2003 and 2006.
- Gender: *The number of women stockists surveyed was too small to allow for statistical significance to be determined.*

Impacts of Business Location on Stockist Performance

- *The number of stockists surveyed in and near the capital towns of Mbale and Masindi was too small to allow for statistical significance to be determined.*

² Note that this is a correlation and no directional causal link is implied. The result may be because the AT Uganda trainings were particularly attractive to small and/or new stockists.

Farmer Results: Impacts of the AT Uganda BDS Project

Impact on Farmers of AT Uganda BDS Training for Stockists

- Farmers who shop with a stockist trained by AT Uganda
 - make significantly more from the sales of their products than farmers who do not. (*significant difference: test of independent means*)
 - have significantly higher agricultural input costs

Impacts of Stockist Marketing Strategies

- Farmers who heard radio advertisements for agricultural inputs
 - had a significantly larger increase in the number of types of seeds that they purchased between 2003 and 2006 than farmers who did not hear radio advertisements
 - did not spend significantly more on seeds than farmers who did not hear radio advertisements

Input Use and Sales

- Farmers who increased their input use between 2003 and 2006
 - did not have significantly increased income from sales of crops
 - did not perceive significantly increased profits

Impacts of Farmer Demographics

- Younger farmers
 - do not spend significantly more on agricultural inputs or buy significantly more types of inputs than older farmers
 - are not significantly more likely to choose to purchase agrochemicals than older farmers
- Farmers with higher levels of education
 - are significantly more likely to spend more on inputs than farmers with lower levels of education
 - are more likely to purchase a higher number of agrochemical inputs and of inputs in general.
- Illiterate farmers are less likely to purchase inputs than farmers with primary educations.
- Women farmers are not significantly less likely to purchase agrochemicals or seeds than men farmers.

Farm Location

- The distance of a farm from a large town made no difference in whether or not a farmer purchased agrochemicals or other agricultural inputs.
- Farmers in remote areas are not significantly less likely to purchase inputs than farmers near the large towns of Mbale and Masindi.
- Farmers in rural areas spent significantly more on inputs and bought significantly more types of inputs than did farmers near the large towns of Mbale and Masindi.

Broader Considerations for Similar Future Projects

Project-sponsored Advertisements were Effective in Providing Information to Farmers. Even farmers who received no advice from the people from whom they bought inputs reported hearing advertisements on the radio – and said that their purchases and practices were influenced by the advertisements. Still, some farmers who said that they heard advertisements – and heard their neighbors talking about improved yields – said that they did not buy inputs because they could not afford the purchase price. One farmer who did purchase some improved inputs noted that his main limitation in increasing inputs is still money, “Whatever comes out from sale of produce cannot be reinvested due to many pressing problems.”

Sustainability of Impacts. The fact that this study was conducted well after the project had closed allowed for some aspects of sustainability to be seen, and many of the main thrusts of the project appear to be still functioning. It appeared that the relationships between suppliers and stockists that the project helped build through the credit guarantee program may have continued to be useful to both groups. While the project’s link with UNADA (Uganda National Agro-Inputs Dealers Association) was clearly seen to be important by stockists and large-scale suppliers alike, there were some questions about the sustainability of some of the activities that the project had supported, with project-affected stockists in both focus group discussions noting the UNADA’s local activities had dwindled or become dormant. Stockists appeared to be continuing to provide many of the services to farmers that the project had promoted. The exception was that it appeared that some of them had stopped using demonstration plots as a means to teach farmers about inputs (the project had provided significant support to the establishment and maintenance of these plots).

Lack of Effective Markets for Agricultural Products. One very important aspect of farmer poverty appears to be the set of links in the value chain relating to sales of farm products. While farmers can improve the quality of their production by such means as the purchase of improved seeds, where there is little to no differentiation in market price for high vs. low quality products and a paucity of places to sell their products beyond local markets, the marginal returns to increased investment can be low, or even negative. Several stockists and suppliers pointed out that it was hard to convince farmers to use improved seeds or agrochemicals when there was no market price differentiation for improved products. While 88% of farmers said that it was “easy” or “very easy” to find buyers during peak season, they typically sold their goods at harvest time at local markets where prices paid were low compared to prices at other times of the year and in other places. A few stockists reported that they purchased farmers’ products, but there was very limited coverage and it was unclear whether this provided a draw to farmers. Many stockists did provide information on places to market products, but this was of limited utility to small farmers as the economies of scale and transaction costs for getting their small harvests to market were daunting. As one woman put it, “the stockist gives advice on markets if a farmer has enough quantities, but with small quantities [I] just take it to the market.”

Overall Impacts. The project appeared to be successful in training stockists to improve their ability to help farmers. The advertising supported by the project was seen as influential by farmers. The credit guarantee program supported by the project was effective in helping stockists to purchase inputs from suppliers – and in helping suppliers secure repayment from potentially delinquent borrowers.

However, the ultimate impact on stockist – and farmer – profits is unclear. The data here do not support a conclusion that stockists who received BDS support had higher profits. The farmers who shopped with stockists who received BDS support did spend more on inputs and did make more from sales of their products. However, their profits were not significantly different from the profits of farmers who shopped elsewhere. The primary drag on improving the profits of both stockists and farmers continues to be farmer poverty, which itself appears to be linked to farmers’ limited options for selling their products. This poverty, along with the structures that maintain it, appears to be so entrenched that Business Development Services, while clearly appreciated by both stockists and farmers, may be, by themselves, insufficient to significantly improve the profits of stockists and farmers in this region of Uganda.

I. PURPOSE OF THE STUDY

This study of Business Development Services (BDS) in Uganda is part of a broader study, supported by USAID/EGAT/MDD, to explore the contributions of the Business Development Services market development approach to strengthening micro- and small enterprises (MSEs) and to the amelioration of poverty. Companion studies were implemented in Azerbaijan and India. This set of studies was intended to contribute to measuring the impacts of the IGP projects on microenterprise performance and poverty measures. The results are intended to provide information that will help practitioners to gain a better understanding of the impacts and of the cost effectiveness of current approaches to BDS market development (including methods for conducting impact assessments) and to improve understanding of good practice in BDS programming.

The study reported here is centered on a USAID-funded project implemented by AT Uganda Ltd. entitled *Facilitating Agricultural Input Distribution Linkages*. The AT Uganda project was designed to assist the agricultural input distribution sector by strengthening the linkages among large-scale distributors, stockists (small-scale retailers), and farmers. It focused on assisting stockists who sell agricultural inputs to farmers to play a stronger role in providing other business services related to agricultural production and marketing.

This study is designed to describe the current business situation of farmers and of the business services providers - small retailers or “stockists” - who sell agricultural inputs to farmers and who can play an important role in providing other business services related to agricultural production and marketing.

This report summarizes the change in the business situation of Ugandan stockists and farmers in who were surveyed in the Mbale and Masindi districts where AT Uganda’s project was implemented. The initial phase of this research took place in October 2003. In November 2006, the field research team replicated the 2003 study. Both quantitative and qualitative data are used to describe the changes in business situation of the direct target population - large and small input stockists - as well as the farmers and wholesale distributors/suppliers who are indirect beneficiaries of the project. Three groups within Uganda’s agricultural supply chain took part in this study: 1) Large and medium scale agricultural suppliers/distributors; 2) Agricultural supply retailers (stockists); and 3) Large and small-scale farmers.

The quantitative data covers three substantive aspects of the stockists’ business: 1) the structure (i.e., labor, customer base, goods/services offered); 2) affiliations and management practices; and 3) costs and sales. As a complement to these figures, the qualitative data illuminates stockists’ perspectives about perceived operating constraints and what they feel they need in order to be able to expand their business activities. The analysis draws from a mixed-method complementarity design. The qualitative and quantitative study methods were implemented as discrete aspects, and the results are integrated here to provide “breadth and representativeness” complemented by “depth and contextual relevance.”³

For the results of the baseline study conducted in the 2003, please see *Rees Warne and Tristi Nichols (Weidemann Associates, Inc.), “Initial Phase Report for Uganda: IGP-BDS Project #1064: AT Uganda: Facilitating Agricultural Input Distribution Linkages (April, 2005) available from the USAID/EGAT/MDD, Weidemann Associates, Inc., or the authors.*

³ Caracelli, V.J. and Greene, J.C., ‘Crafting mixed-method evaluation designs’, *New Directions for Program Evaluations*, 74, Summer 1997, p.23.

II. OVERVIEW OF THE AT UGANDA PROJECT

1. CONTEXT: AT UGANDA'S PAST PROJECTS

Initially a branch office of EnterpriseWorks, AT Uganda registered as a non-governmental organization (NGO) under Ugandan laws in 1994. AT Uganda's strategy in Uganda has focused on integrating agricultural extension, production, agro-processing, agro-input distribution, business development services, market development, technology development, training and capacity building, and sustainability. AT Uganda's efforts have been directed towards the Ugandan districts that are the poorest, most remote, and most lacking in services. From its inception to the time this study was conducted, AT Uganda expanded its operations from one district to twelve districts in Northern and Eastern Uganda. A recent impact study showed that AT Uganda's activities benefited 1,392 rural non-farm micro-level enterprises in 2001 and that women made up approximately 44% of the economic participants. The cumulative total monetary benefits from AT Uganda's project activities from 1994 to 2002 exceeded US\$ 8.4 million.

Prior to the USAID-financed project studied here, AT Uganda's assistance supported retailers – called “stockists” in rural areas *directly* by supplying them with agricultural inputs for sale on credit. Roughly 115 stockists in various parts of the country had participated in AT Uganda's input distribution network before this project began. An additional 106 stockists had linkages to distributors who received support from the IDEA project.

2. AT UGANDA'S BDS PROJECT: “FACILITATING AGRICULTURAL INPUT DISTRIBUTION LINKAGES”

The AT Uganda project that was the subject of this research, *Facilitating Agricultural Input Distribution Linkages*, operated in Masindi and Mbale. It diverged from previous projects in that this project focused on *facilitating linkages to input supply and other BDS services* rather than *supplying inputs and services directly* to stockists. The new approach was designed to inspire demand for agricultural inputs through an integrated set of activities including training stockists in business management, supporting demonstration plots run by stockists, and educating farmers. This project had five components: 1) Training; 2) Inciting demand for inputs; 3) Market access; 4) Linkages facilitation; and 5) Credit.

Component 1) Training. Stockists were offered the opportunity to purchase training in areas designed to strengthen their capacity to manage their business (advertising, marketing, and bookkeeping) as well as in areas that were expected to enable them to better serve the farmers residing around them with various inputs (seed varieties, fertilizers, herbicides, use of certain tools, and the knowledge of how to use these well). The training included three one-week courses, all of which were provided by private service providers. The trainings were carried out in six regional towns, and this decentralization of training locations assisted in maintaining low transport costs. The stockists directly paid the private service providers for their training. They also paid the cost of their own meals, accommodation and transport while attending training. AT Uganda subsidized the private service providers' cost of creating training modules and products by facilitating curriculum development, Training of Trainers, and training quality monitoring.

Component 2) Inciting Demand for Inputs. The purpose of this component was to inform and inspire farmers to purchase and use inputs a) through media and education campaigns and b) through the use of demonstration plots:

- a) Media and education campaigns included radio, pamphlets, newspaper, tradeshow, and magazines, all of which informed farmers about the usage of various inputs and the location of rural stockists who could supply them.
- b) Demonstration plots were used as a marketing tool whose purpose was to increase farmer demand for certain inputs (seed varieties, fertilizers, pesticides). The demonstration plots were organized and

supervised through stockists' and farmers' groups in the districts targeted by the project. The size of the plots varied, though they did not exceed one half acre in size. Crops grown included cow peas, ground nuts, maize varieties, and rice. Each plot demonstrated the use of improved seeds, fertilizers, and herbicides by using a "control" section of the plot juxtaposed with an "experimental" section where improved techniques were used. Extension personnel regularly advised about specific crop techniques for a fee provided by AT Uganda (through the stockists). Seed companies provided seeds and other large suppliers provided the inputs to the stockists as part of their strategies for promoting their products. Stockists paid extension workers for production advice – using funds provided by AT Uganda. The farmers on whose land the demonstration plots were located kept the ensuing harvest. It is worth noting that some non-participating stockists also planted demonstration plots during the project period, though many did not establish control and experimental areas in their plot.

Component 3) Market Access. The project facilitated linkages between the stockists and existing sources of market information. Stockists received a 3-day orientation on markets and marketing facilitated by the International Institution of Tropical Agriculture (IITA). IITA had the role of market information provision throughout the project and explained to stockists how to use this market information. In addition, AT Uganda sent out a weekly reader/newsletter with the latest price information to stockists, who in turn made this information available to farmers. The newsletter informed farmers about the outlets where products could be sold as well as about price trends for certain crops.

The program also worked to establish links between the Ugandan Grain Traders Limited (UGTL) and the stockists. The objective was to assist the stockists to become 'one-stop-shops' both supplying inputs at the beginning of the season and buying back produce after harvest as agents of UGTL.

Component 4) Credit Linkages. At the time the initial research was carried out, AT Uganda did not support any credit linkages for stockists. Shortly thereafter, AT Uganda began a credit guarantee program. Under this credit guarantee program, each UNADA (Uganda National Agro-Inputs Dealers Association) branch acted as a solidarity group for a 60-day suppliers' credit. Each UNADA group consolidated its order and paid a 50% down payment. AT Uganda facilitated the process by offering an 80% guarantee on the outstanding credit. The objective was to make it easier and more attractive for suppliers to provide credit for purchase by facilitating purchases through a small number of *groups* of stockists, thus removing the stress and transaction costs of managing credit to a large number of individuals and mitigating the risk of default on the loans.

III. CAUSAL MODEL

The Causal Model for this research is shown on the next page. Please note that this is a revised Causal Model. Because it was modified after the initial research was conducted, not all of the elements that are contained in it were included in the initial field research. They were, however, included in the final phase of the research, and retrospective questions were added to address the gap.

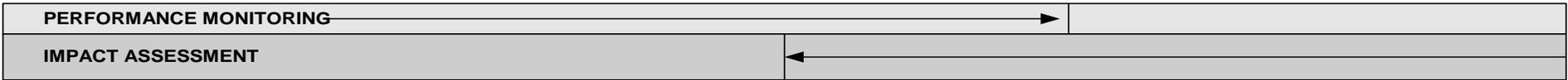
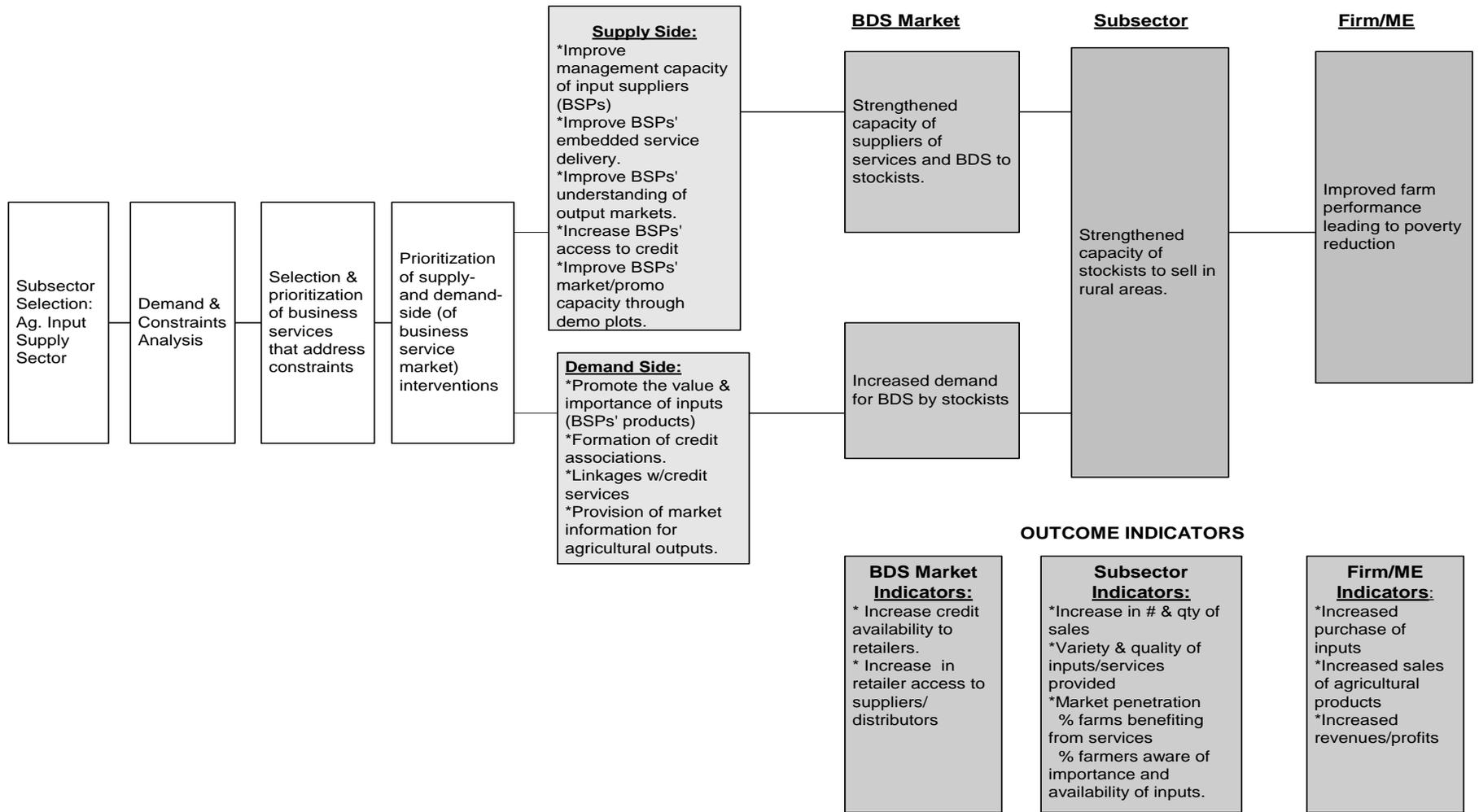
The hypotheses which were explored through this research were based on the original Causal Model and were designed by Dr. Lucy Creevey for this research. The full set of hypotheses can be found in Dr. Creevey's "Draft Research Plan: Uganda." Summaries of the hypotheses that were explored through the two phases of this research can be found in Annex 2.

Causal Model: Uganda

PRE-INTERVENTION ACTIVITIES

FACILITATION SERVICES

OUTCOMES



IV. METHODOLOGICAL SUMMARY

The two phases of this longitudinal study, which was conducted through quantitative questionnaires, semi-structured in-depth interviews, focus group discussions and observations, took place in 1) October and November of 2003 and 2) November and December of 2006. The results from the initial phase of the research provided the baseline and basis for assessing changes due to project for the final report.

1. QUANTITATIVE DATA

Remediating Sampling Problems in the First Phase. The research team the ran the initial phase of the study in 2003 had some substantial problems in targeting stockists and farmers to be interviewed. While the interviews that they conducted were of good quality, the coverage in the area of interest was poor. This left the team entering into the follow-up research with the challenge of filling in the gaps.⁴ It was determined that quality results could be obtained by geographically retargeting the work, re-interviewing stockists and farmers where possible, and including retrospective questions to provide a balance of information to complement the 2003 data.

Stockist Sample. The 2003 research team interviewed a total of 144 stockists. However, 85 of those interviewed had shops in Kampala (where the project did not operate), and only 56 of the stockists were in the project's focal area in the districts of Mbale and Masindi.

The 2006 research was conducted entirely in Mbale and Masindi, and 72 stockists were interviewed. The field research team identified a set of counties in the districts of Mbale and Masindi that had comparable characteristics and in which both experimental and control stockists could be found. Information from the stockist association UNADA and from the AT Uganda project was used as a basis from which to select the experimental group of stockists. In drawing the "experimental" sample, specific individuals from the list of stockists who had participated in AT Uganda project trainings and/or the project's credit guarantee program were drawn based on 2 criteria 1) whether they had been interviewed in 2003 and 2) location. For the control group, comparable stockists were then sought within the counties where the experimental stockists were located.

The qualitative and quantitative survey instruments were redesigned to include retrospective questions to allow for filling in gaps for stockists who had not been surveyed before and to allow for triangulating the information from the 2003 research

Farmer Sample. Consultations with officials in the District Departments of Agriculture assisted in developing a list of appropriate sub-counties that met the study criteria (mix of sub-counties near the large towns of Mbale and Masindi and in rural areas, mix of large and small farmers, etc.). The criteria for purposeful selection of parishes within those sub-counties included i) a major farming parish, and ii) the strong likelihood of finding both farmers who owned and cultivated more than five acres of land and subsistence farmers. From each of the selected parishes, two villages were randomly selected, summing to the total amount of ten target villages from 5 parishes. In each village, the research team met with the local committee/village leaders to develop a comprehensive list of households. The local leaders, along with community members, identified households who fit the sampling criteria. All surveyed farmers were randomly selected using the fish bowl technique. A total of 349 farmers were interviewed. However, this technique did not take into account the need to link farmers with either control or experimental stockists, and the sampling needed to be refined for the 2006 work.

In 2006, parishes were purposively selected in each of the sub-counties chosen for the sample. These parishes were selected 1) such that they were home to either one or more experimental stockist OR one or more

⁴ The author of this report began working with this study in 2005, over a year after the initial research was conducted. At that time, she took over the analysis of the data and wrote sections of the initial phase report.

control group stockists and 2) such that the experimental and control parishes were themselves comparable. Where possible, these parishes were selected so that they overlapped with the parishes included in the 2003 research. In total, 93 of the farmers surveyed in the original sample were re-interviewed in 2006. Sixty additional farmers were added in 2006 to assure that there would be adequate representation of farmers with the characteristics specified by the study design. These were selected such that half of them lived closest to an experimental stockist and half to a control stockist. As for the stockists, retrospective questions were added to the farmer questionnaire.

Definition of Experimental and Control Groups. The sample was designed to be comprised of approximately half experimental group and half control group farmers. The field 2006 sampling was originally sub-divided into two groups: 1) farmers who lived in a sub-county with a stockist who participated in the AT Uganda project (the experimental group) and 2) those who lived in a sub-county with a stockist who did *not* participate in the AT Uganda project (the control group). Ex ante we had planned to draw the sample based on stockist “catchment areas.” That is, we choose parishes where we knew that there was a shop run by a stockist who either had or had not participated in the project. We then drew a random sample of farmers in a village or town within that parish and near to the shop. Because what we were interested in was the impact on farmers of shopping with a stockist who had received BDS training, we also asked who they purchased their agricultural inputs from. The farmers who shopped with a stockist who had participated in the AT Uganda project were defined as the experimental group. Farmers who purchased their inputs elsewhere were categorized as the control group.

Large Scale Seed Producers and Wholesale Distributors. These businesses were selected based on the role that they play in supplying inputs to the stockists in the study area. Staff from thirteen of these were interviewed: three were seed producers and 10 were wholesale input suppliers or input distributors.

2. QUALITATIVE DATA

Large-scale Seed Producers and Wholesale Distributors. In both 2003 and 2006, three in-depth interviews were conducted with representatives of large-scale seed producers and wholesale distributors.

Stockists. Four in-depth interviews were conducted with stockists, three with women and one with a man. Six stockists participated in focus group discussions: three of them were men and three were women. This was done in both 2003 and 2006.

Farmers. Eight in-depth interviews were conducted with farmers. This was done in both 2003 and 2006. Half of these were with women and half with men. Half were with small farmers and half with large farmers. Finally, half were with farmers who lived near the large towns of Mbale and Masindi and half were with farmers who lived in rural areas. Fifty-six farmers participated in focus group discussions: 34 of them were men and 22 were women.

3. CONSIDERATIONS IN INTERPRETING THE DATA

Study Period and Project Period. The initial study was carried out after the project had already begun, so it is not a true baseline. However, because some project impacts necessarily have a time lag (e.g., because of the time between planting and harvesting and the time between purchasing an inventory and selling it), this has likely not made a substantive difference. On the other hand, there is little or no time lag for some impacts (such as the time between learning a new skill and applying it). Because the follow-up study was carried out well after the project had been completed, it contains some elements of the sustainability of project impacts beyond the life of the project, which is a valuable opportunity.

Wide Variation in the Data Set. Some results here cannot be taken to be definitive. Some of the data, particularly data on costs and sales, were not normally distributed. There was very high variation in the data, particularly in data on costs and sales, and removing different sets of both farmers and stockists from the sub-samples

being analyzed did, in some cases, have a strong impact on the strength of relationships found and on whether or not they were statistically significant. In these situations, a variety of sub-sample “slices” were run to test the robustness of the general conclusion reported here (positive or negative relationship and/or statistical significance) and the final slices were chosen based on statistical considerations (such as number of standard deviations from the mean or gap between the data peleton and the outliers) and on how robust their results were.. Where appropriate, non-parametric statistical tests were run.

Lag Time between Agricultural Input Purchases and Earnings at Harvest. Farmers were asked about agricultural input expenses over the previous month, agricultural season, and year. Because agricultural cycles are long, sales after harvest are not always captured in the same time period as the expenses. Changes in earnings by farmers who recently made significant changes in their input purchasing practices may not have been captured here.

Adjusting for Inflation. The overall inflation rate for Uganda between 2003 and 2006 was 18.6%, so the 2003 cost and sales data were adjusted for inflation by multiplying them by 1.186. This method of controlling for inflation is not completely accurate, however, as agricultural inputs prices and agricultural product prices may not have changed at the same rate as overall inflation in Uganda. In most cases where change in costs, sales or profits between 2003 and 2006 are at issue, the 18.6% inflation adjustment is used. In cases where the significance of a finding might be affected by whether or not an inflation adjustment was made, both figures are included for comparison.

Reporting in \$US. The Ugandan Shilling to US dollar exchange rate at the time of the 2006 survey was .0005525. In most cases, sales and expenditures have been converted to US dollars. This was done to make it easier for a wider audience to interpret the data and to make it more clear that the amounts being managed on farms and in stockists shops is really quite small: it can be difficult for someone not accustomed to working Ugandan shillings to intuit that a change in sales of half a million Ugandan Shillings is equivalent to a perhaps less ostensibly impressive change in income of US\$ 276.

Estimated and Calculated Costs and Sales. Stockists were asked about their sales and expenses in three ways. They were asked to *estimate* their *overall* sales and costs over the previous *two agricultural seasons*. Profit was calculated ex post based on these. Stockists were also asked about the specific agricultural inputs that they sold and asked to *calculate* how much they earned on sales of each specific input during the *present agricultural season*. Finally, they were asked how much they spent over the *past two seasons* on purchasing their inventories of those specific inputs for their shops. The calculated sales and costs may be assumed to be a more accurate reflection of their agricultural inputs business than their estimated overall sales and costs. However, the estimated sales and costs are necessary because farmers have different cropping patterns during the year’s two agricultural seasons. For some tests that were run, the season estimates and 12 month estimates do not jibe. Where this is the case, both are reported.

Complex relationship between sales, cost of inventory and profit. The cost (and, subsequently, the profit) figures in this report may be misleading. The 2006 cost value of agricultural inputs purchased is the amount spent on the stockists’ inventory. “Sales” minus “cost value of inputs” is not the same as the profit margin over the sales price of goods sold. In addition, operating costs were not included in the calculations. However, in most cases, it is the relationship of these figures across time and across the control and experimental groups that is of interest rather than the ostensible numbers themselves.

V. OVERVIEW OF THE CONTEXT AND THE RESPONDENTS

1. OVERVIEW OF THE FARMING SECTOR IN MBALE AND MASINDI

Agro-economy. Poverty and market isolation are central factors affecting farmers and the stockists who sell them inputs. In 2003, the per capita income of Ugandans was \$330, with 9.5 million people living on less than a dollar a day. In 2002, 38% of Ugandans lived below the poverty level.⁵ Ninety-six percent of all farmers surveyed said that they would have wanted to use more purchased inputs than they did. Fifty-eight percent said that they could not purchase additional inputs because they did not have enough cash available when inputs were needed, and 47% of farmers said that they can't afford to buy additional inputs (don't ever have the cash) at all. While this has to do with poverty in general, it is also related to the lack of effective markets for the crops that farmers are able to produce.

Large-Scale Distributors and Seed Producers. Most stockists purchase their inputs from seed producers and input wholesalers and distributors, and the project also worked with these businesses to improve their support to stockists. The thirteen large-scale businesses that were surveyed characterized their customer base as including a) stockists from peri-urban, urban, and rural areas (an average of 57% of their customers were rural), b) farmers, including commercial farmers, small farmers and farmers' groups (31%), and c) NGOs (12%).

Stockists. In addition to the seeds, agrochemicals and small tools that they offer for sale, stockists mentioned offering the following services: advice about inputs use, credit to 'trusted customers,' training to farmers through demonstration plots, discounts on [new] products, purchase of farmers' products, information about prices for farm produce and livestock as well as about places to market goods, formal training, and printed information.

Farmers. Farmers in Mbale and Masindi tend to have highly diversified crop mixes. Crops that surveyed farmers mentioned growing include (in order of frequency mentioned) maize, beans, cassava, sweet potato, groundnuts (peanuts), banana and plantain, finger millet, coffee, tomatoes, onions, sunflowers, cabbages, soy beans, Irish potatoes, sorghum, rice, sugar cane, leafy greens, trees fruits, cotton, pigeon peas, tobacco, and pineapple. Most farmers buy seeds, but relatively few buy pesticides, fertilizers or herbicides.

Poverty and Markets. At the root of stockists' earnings is farmers' ability to pay to purchase inputs from them. And at the root of farmers' ability to pay is their ability to earn income from the sale of their crops. While the project's credit guarantee program helped stockists to have increased access to capital to purchase inputs, and at the same time allowed them breathing room to provide informal credit to farmers, farmer ability to pay for inputs continues to be a barrier to increased input sales. This poverty seems to color all aspects of this area of the value chain.

2. PROFILE OF STUDY PARTICIPANTS

This section provides an overview of the business/farm characteristics of the three groups surveyed using quantitative and qualitative methods: a) large scale wholesalers/distributors and seed producers, b) stockists, and c) farmers.

While at the time of the initial field research in 2003 some stockists in the Mbale and Masindi area had begun to participate in AT Uganda activities, the project later worked with many more. In addition, the lag time in impacts on businesses based in agricultural seasons would obscure some very early project impacts. As such, the first stage results can, in general, be treated as a baseline, and the report on the initial phase of the research discussed the characteristics of stockists in general. For the final phase of the research in 2006, we identified the stockists who participated in the AT Uganda Project (the experimental group) and the stockists

⁵ USAID. Budget: Uganda. <http://www.usaid.gov/policy/budget/cnj2005/afr/ug/html>. (accessed May 30, 2007).

who did not (the control group) and analyzed the project impacts through the differences in the situations of two groups at that time.

Likewise, the farmers who were surveyed during the first phase of the research were treated as a common group at that time. For the follow-up research in 2006, farmers were classified into experimental (impacted by the project) and control groups based on whether they were clients of stockists who participated in the AT Uganda project or clients of stockists who did not.⁶

2.A. Large-Scale Distributors/Producers⁷

While the project focused on work with stockists in Mbale and Masindi, they are just one link in the agricultural production value chain. Most stockists purchase their inputs from seed producers and input wholesalers and distributors, and the project also worked with these businesses to improve their support to stockists. Not only do these businesses have a birds eye view of what is happening in the agricultural sector, but they are also in a position to be impacted by changes in stockists' business practices and business fortunes.

A total of thirteen individuals representing large-scale seed producers and wholesalers/distributors⁸ took part in the study through face to face questionnaire-based interviews. Nine of these were in Kampala, three were in Mbale and one was in Masindi. Three were primarily seed producers. While the other 10 functioned primarily as wholesalers and/or distributors, two of these were also involved in some seed production. We also conducted in-depth qualitative interviews with three of these businesses: one each in Mbale, Masindi and Kampala. Table 1 presents some details about these businesses.

Table 1: 2006: Profile of 3 Seed Producers and 10 Input Wholesalers/Distributors

	Seed Producers (n=3)			Input Distributors (n=10)			All
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Mean
Number of years in business	4	10	6.7	3	30	8.8	8.3
Number of full time male employees	1	15	9.7	1	38	8.9	9.1
Number of full time female employees	1	10	5.3	0	15	3.1	3.7
Number of seasonal male employees	0	110	53.3	0	17	2.8	15.4
Number of seasonal female employees	0	90	46.7	0	1	.1	11.8
Number of outgrowers	0	750	255.0	0	15	1.6	60.1
Number of outlets in the first season of 2006	2	7	4.0	1	150	16.8	13.8
Number of outlets in 2003	2	3	2.7	0	80	11.3	9.2

⁶ Note that there is some spillover as the radio advertisements for stockists and agricultural products that the project sponsored could have been heard by all farmers in the survey area. However, the project was designed to work specifically with stockists to help them improve their business practices and their ability to support farmers, so we feel that the participating stockists' impacts on farmers are still distinguishable. See also Section 2.C.1 below for a discussion of the breakdown of relationships between participating and non-participating stockists and farmers.

⁷ Note that, while this section occasionally provides information on the results of the interviews in both 2003 and 2006, some of the businesses interviewed in 2003 were not interviewed in 2006 and visa versa. Thus this section does not provide perfectly correlated information on change in business practices. Since only 56 stockists were surveyed in the project area in 2003, it was necessary to include additional stockists in 2006 in order to be able to have statistically significant results.

⁸ These are distributors who focus on selling to stockists rather than stockists who focus on selling to individual farmers.

These large-scale suppliers characterized their customer base as including a) stockists from peri-urban, urban, and rural areas, b) farmers (commercial farmers, small farmers and farmers' groups), and c) NGOs (See Table 2). All businesses surveyed said that they sold to both stockists and farmers, and 12 of the 13 said that they sold inputs to NGOs. When asked to estimate what proportion of their customers comes from the abovementioned categories, their average was that 57% of their customers were stockists, 31% were farmers, and 12% were NGOs. (Note that this simply measured the percentage of customers, not the percentage profits that came from those customers.) An average of 28% of their clients were rural stockists and 18% were small farmers, closely followed by urban stockists at 17% of clients.

Table 2: Distributor, Wholesaler and Seed Producers' Customer Base

Customer Base	# of Customers
Rural Stockists	28%
Urban Stockists	17%
Peri-Urban Stockists	12%
Small Farmers	18%
Commercial Farms	10%
Farmer Groups	3%
NGOs	12%

Large-scale suppliers were asked about the factors that limited their business growth. All of the distributors participating in in-depth interviews in 2003 talked about how 'fake seeds' and 'unlicensed dealers' compromised their market share.⁹ In 2006 half of the stockists interviewed mentioned fake seeds being a problem. This was the most common concern cited by suppliers participating in the quantitative questionnaires as well. (See Table 3 below.) As one seed producer put it:

Fake products on the market cause unfair competition. This is compounded by the fact that farmers have not reached serious commercial levels to be selective such that they do not purchase the fake products. Some retailers rush for the fake products as they offer a large profit margin and the items are cheaper, which entice the unsuspecting farmers. There is a policy against fake products but its implementation is not working.

Table 3: Factors Cited as Limiting Business Growth by Seed Producers and Input Wholesalers/Distributors

Factors Limiting Business	# of Wholesalers/Distributors Citing this in 2006 (n=13)
Competition with cheaper "fake seeds" on the market	7
Price undercutting	6
Delayed payments by distributors & stockists on credit guarantee	6
Unable to meet stockists' full needs as some items may be missing	4
Ignorance of farmers related to purchased inputs	4
So many customers swarm the place hence delays to get served	3
Late payments by customers	3
Default payments by customers	3
Difficulty and expense in transporting deliveries	2
Damages during transportation	2
Delays and failure to deliver orders we placed	3
High government taxes	3
No quality assurance on products we purchase	3
Failure by stockists (or agents) to sell items	2
Seasonality of business	1
Losses due to poor seed viability (<i>seed grower speaking of seed inputs</i>)	1
Underweight input packages	1
High bank interest rates	1

⁹ "Fake seeds" are essentially ordinary seeds being marketed as improved varieties or improved seeds that are stale or damaged.

Another theme mentioned repeatedly in in-depth interviews was that stockists' demand for goods is "too low" or "uneven." Uneven demand leads some stockists to cease operations during off seasons. As one medium-scale distributor put it, "the low sales period causes the stockists in my network to close their shops." (Distributor in Mbale) That, combined with the low level of inputs used by small farmers, is seen as a central operating constraint by these businesses. In sum, these perspectives illuminate the constraints that impede wholesalers from a) supplying the seeds to their customers in large quantities and b) increasing farmer utilization of agricultural inputs.

Finally, when asked in 2006, "how difficult it is to provide goods during the peak season?" seven of those surveyed responded *very difficult*, three replied *somewhat difficult* and three responded *fairly easy*. In contrast, in 2003 none responded *very difficult*, with half responding *somewhat difficult* and half responding *fairly easy*. It is not clear what has led to this change, although one representative of a large-scale supplier did say that he felt that stockists and distributors had a "poor culture of stocking inputs for the subsequent seasons," noting that "stockists, NGOs and commercial farmers do not stock early, waiting to make rush purchases as planting time sets in." One farmer who lived near the town of Masindi talked about how this affected her, saying, "last year seeds were delivered late at the stockist's and yet planting time was running out." Although she had wanted to use improved seed, she said she had to resort to local seed.

2. B. Profile of Study Participants: Small Scale Retailers (Stockists)

The quantitative survey was intended to measure the ways in which business sales and profits have changed over time, taking into consideration demographic characteristics, business size, access to credit, and exposure to Business Development Services (BDS) through AT Uganda or any other organization. Qualitative data from in-depth interviews and focus groups illuminates the context of the operating environment. The qualitative data is intended to capture the underlying constraints related to a) selling inputs; b) securing inventory from wholesalers; and c) business management. Again, because the project focused on the up-country districts, this report is based on interviews with stockists in Mbale and Masindi.

2.B.1. Stockists Surveyed

In 2006, 73 stockists were interviewed in the districts of Mbale and Masindi, the region where AT Uganda initiated work under the project. In 2003, 56 stockists were surveyed in this region. Thirty-five percent live in rural villages, 35% live in small towns or trading centers (many of which are very small), and 30% live in or on the periphery of the towns of Mbale or Masindi.

Table 4: Location of Stockists Surveyed

Location/Region	2003	2006
Mbale	31	48
Masindi	25	24
Total	56	72

Thirty-four of the stockists interviewed in 2006 were classified as "Experimental Stockists" and 38 were classified as "Control Group Stockists." Stockists were classified as belong to the experimental group if they had attended at least one training sponsored by AT Uganda and/or if they had participated in the AT Uganda credit guarantee program.

Stockists in Mbale and Masindi have been selling agricultural inputs for an average of 3.5 years. One third of these stockists had been in business for one year or less. Nine of the stockists who were surveyed in 2003 and who attended AT Uganda training had operated their business for one year or less at the time of that initial

study. Qualitative data indicates that it was precisely for this reason that they were particularly interested in acquiring business training.

Most of the people who were interviewed, 65 of the 72, were the owner of the shop. When the owner was not available, an assistant familiar with the business was interviewed. Of the actual owners, the mean age of the stockists surveyed is 42. Eighty-eight percent of them are married. Twenty-two percent had primary education, 51% had secondary (ordinary level) education, and 25% had advanced secondary or tertiary level education. Their mean number of household members is 9.5 (with a mean of 6.3 being children). Seventeen of the stockists surveyed (28%) were women. Ten of the 31 shop owners who had received BDS training from AT Uganda were women.

2.B.2. Customer Base

The stockists reported that an average of 21% of their customers come from “peri-urban” areas (near the large towns of Mbale or Masindi towns), while an average of 77% of their customers come from rural areas. Half of the stockists had no customers from peri-urban areas, and 8% had no customers from rural areas. They reported that a mean of 23% of their customers were large farmers and 77% were small farmers. Thirty-one percent of their customers were women – up from 17% women customers in 2003. Their average number of customers had increased from 230 in 2003 to 449 in 2006 (when the top three outliers are left out of the analysis).

2.B.3. Business Structure and Inputs and Services Offered

It is notable that 54% of stockists report extending credit to “trusted” customers, and the data from qualitative sources reinforces this claim. In-depth interview data indicates that farmers may not have cash in hand at the time when it is needed to purchase inputs - which prompts stockists to issue credit to some of them. Farmers who are unable to repay with cash pay back in kind (with produce). Stockists reflected during a focus group discussion in Mbale that this adversely affects their cash flow. Table 7 presents the most common *services* that stockists offer in addition to the inputs that they have for sale.

Table 5: Services Offered by Stockists

Services offered to customers	% of Stockists	
	2003	2006
Advice about input use	64%	90%
Credit to ‘trusted customers’	28%	54%
Training to farmers through demonstration plots	27%	40%
Discounts on [new] products	19%	25%
Purchase farmers’ products	17%	25%
Information about prices for farm produce and livestock	15%	21%
Information about places to market goods	11%	18%
Formal training for farmers	4%	13%
Printed information	8%	11%

2.B.4. Stockists’ Business Sales and Costs

Business sales and costs are treated extensively in the hypothesis testing in the “Factors Affecting the Impact of BDS” section below. Stockists were asked the same types of triangulation questions about their sales and costs in 2003 and 2006, with the exception that in 2006 stockists were also asked retrospective questions (because additional stockists were added to the 2006 sample). Note that while relative changes may be

expected to hold true, the specific cost and sales figures must be taken with a grain of salt. Stockists responded to three types of triangulation questions about their sales and costs. First, they were asked specifically about sales and costs for individual items in each of the most recent agricultural season and in the corresponding season three years ago. This can be expected to be the most accurate measure, but it only covers a limited set of input items. Second, stockists were asked to estimate their overall costs and sales for the most recent *two* agricultural seasons and again for the corresponding seasons three years ago.¹⁰ Third, they were asked to estimate their sales and costs over the previous 12 months and the same period three years before. The latter two cover a broader scope, but they are general overall estimates rather made without prompts for specific types of income and expenses. Additionally, some stockists may have been reluctant to reveal full financial details about their business.

2.B.5. Business Income's Contribution to Household Income

Fifty-five percent of the stockists surveyed said that their business was entirely devoted to agricultural input sales. Eighty-nine percent said that 50% or more of their shop's sales were from agricultural inputs. Even for stockists who were not fully dependent on their agricultural input business for their household income, its contribution to household finances was substantial. Fifty-eight percent of them said that the business accounted for between 25 and 75% of their household income. Seven percent cited the input business as bringing in 90 to 100% (see Table 6).

Table 6: Percentage of the Household Income that comes from the Input Business

% of Household Income	% of Stockists with this % Income from their Input Business	
	2003	2006
76%-100%	16%	7%
51%-75%	20%	25%
26%-50%	24%	33%
25% or less	40%	35%

Almost all stockists surveyed had other sources of income beyond their shops (See Table 7 below). Most stockists (81%) were also engaged in crop farming themselves, and 42% raised animals. Just 30% cited profits from other trade or micro-enterprise activities and only 20% said that anyone in the household received a salary. (See Table 7 below.)

¹⁰ Uganda has a bimodal agricultural season in which farmers cultivate more than one harvest of some crops. Some crops are primarily planted in one or the other of the two seasons.

Table 7: Sources of Income of Stockist Shop Owner's Households (besides the shop)

Household Income Source	% of Stockist Households with this type of Income
What other sources of income do people in your household have from the work they do?	
Profits from crop farming	81%
Profits from livestock	42%
Profits from trade or micro-enterprise	30%
Salaried work	20%
Other labor income	5%
Wage labor	2%
What other sources of income do you have?	
Rents from property	15%
Remittances/gifts	5%
Pension	5%
Savings and monthly interest	5%

The trend in increasing contribution to household income appears to be steady between when the stockists were surveyed in 2003 and 2006, with 57% of stockists recently reporting in 2006 that this contribution had increased over the last year.

Table 8: Over the past year, has the Contribution to Household Income from the Input Business Increased, Decreased or Stayed the Same?

	% of Stockists	
	2003	2006
Increased	60%	57%
Decreased	18%	17%
Stayed about the same	22%	26%

2.B.6. Stockists' Business Affiliations and Access to BDS

All of those surveyed who had participated in AT Uganda activities stated that they belonged to the Uganda National Agro-Inputs dealers Association (UNADA), and this link was supported by the project. In addition to the BDS initiatives promoted by AT Uganda, stockists in the Mbale and Masindi area have been exposed to other interventions which were intended to strengthen the agricultural inputs supply market and ultimately boost stockists' sales. These initiatives included programs administered through international agencies (IDEA and SG2000), the Government of Uganda (NAADS), and international NGOs (ACDI/VOCA, Africare, Catholic Relief Services, TechnoServe, and World Vision) among others. The survey broadly captured information on the extent to which stockists have accessed (if at all) BDS such as training in business management and product handling, use of demonstration plots, marketing information and links, access to credit from suppliers, or/and other activities connected to the sale of inputs.

Overall, the data show that most stockists have received BDS training. Forty-two of the 72 surveyed stockists had received training from AT Uganda or another source. The stockists who reported receiving training were asked to rank the top three most relevant skills they acquired: 68% cited technical skills in the safe use and handling of products, 55% cited customer care, 55% cited bookkeeping and/or record keeping as among their top three.

Customer care came up in in-depth interviews as an important topic. The quote below is from a male stockist in Mbale interviewed in 2003.

We have learned [from training] that the customer needs to be handled *with care* [respondent's emphasis]. We now don't need to frustrate customers, because the way we frustrate customers when she comes or when he comes is like....
---'Can I now get two kilos of beans?' [in a soft voice]
---'Ai, it's over!!! [annoyed voice]
That person doesn't want to hear that. So, now we are trying to cover those loopholes.

During training sessions stockists not only had the chance to formally acquire new skills in business development, but they also had the chance to interact, share information, and negotiate ways to combine mutually-advantageous efforts through informal exchanges among stockists. For instance, one interviewee noted that he heard from another stockist about how not to over-stock, as there are difficulties in selling certain products - which may in turn result in incurred losses. The quote below is notable, as it features the theme of learning from others' mistakes in addition to a) an opportunity for two stockists to collaborate and b) a chance for two business owners to negotiate higher sales from a combined effort.

"For example, I had a colleague who was telling me that last year he bought about 300 bags of maize. So he told me that he did not sell...those seeds did not sell. And, up 'til now, those seeds are in the stock - weevils have really destroyed them. So, we use that example to see that if we can connect to each other...and if we had connected, we could have sold that maize rather than leaving them in the stock to expire or go bad." (Male stockist in Mbale)

Interviews and focus groups in 2003 revealed that some stockists found the up-front costs for training rather high – particularly as the more common model of extension used in development projects in the region is to offer training for free. Project staff indicated that it is possible that some non-participating stockists may have been reticent and may even have not been willing (or able) to pay for training – and may not have been willing to do so until they were convinced that the payoff of training is worth the cost.

2.B.7. Stockists' Perspectives on their Operating Context

Stockists' Perspectives on Farmer Attitudes

In in-depth-interviews and focus group discussions, stockists spoke at length about their ideas on farmers' perspectives on the use of improved seed(s) and fertilizers. One stockist stated that "the resistance by the farmers" was a problem that constrained farmers' demand for inputs. The nature of this constraint is multi-faceted.

One stockist mentioned that "fake seeds"¹¹ contribute to the problem of mistrust and reduce sales. He said that farmers compare the stockists' prices with those they are quoted by sellers in the markets (sellers who are unauthorized dealers), and then the farmers believe the stockist is trying to take advantage of them. Focus group participants also noted that the prices for some inputs are not uniform across the agricultural season, and so farmers may think that the stockists "are trying to cheat them out of their money." Thus, farmers can become suspicious of the stockists' intentions and business.

¹¹ An AT Uganda staff person reports: "There are two categories of fake seeds. One comes from unscrupulous locals who purchase regular maize grain in the market and simply dye it green to look like improved seeds. The second source comes from Kenya. There are Kenyan seed multipliers who take seed that has been rejected by the seed company and then dye it and export to Uganda. This is especially a problem in years when seed is in short supply. Ministry of Agriculture is trying to crack down on the sale of fake seeds and is collaborating with UNADA in this respect."

Stockists employ a variety of strategies to “convince” the farmers. For instance, one stockist explained that many farmers believe that their soil/land “is rich enough” and does not require any inputs. Therefore some stockists use demonstration plots (a project-supported activity) to show the results of application of inputs. By showing farmers the plots, some stockists feel that they gain farmer confidence and earn their patronage.

In spite of perceived farmer resistance to using fertilizer and purchasing inputs, the stockists mentioned a “very high demand” during the peak of the planting season. One drawback from extremely high demand in a short time is that many stockists do not have access to the capital needed to purchase inputs in anticipation of that demand. Having the cash to purchase sufficient quantities and varieties of products that satisfy all consumer needs was articulated as “hard” or “difficult.”

Seasonality

The seasonal aspect of the business was also considered a constraint. Stockists participating in a Mbale focus group noted that first season sales (particularly for improved seed varieties) “are very high, compared to second season sales.” The difference in sales between the two agricultural seasons reflects farmer cultivation practices, as (s)he may re-use a hybrid seed during the second season – even though this is not recommended. Others noted that after the planting season, they focus more on selling chemicals, animal inputs “to pass the time,” or inputs for “crops with shorter seasons.” One stockist noted that “with limited funds, you are forced to sit idle.” This illustrates why some stockists close their shop and engage in another productive activities during the off-season.

Lack of Price Differential for Crops produced from Improved and Local Varieties

A theme mentioned by large scale distributors and retailers is that the harvests from improved seed and local varieties all fetch the same price on the market – even though the quality of the output may vary. Thus, farmers may see limited incentives to use the improved varieties. Interestingly, a difference in harvest *quantity* was not mentioned as a perceived motivation for farmers.

Fragmented Marketing Structure

During the harvest period, farmers have few outlets through which to market their goods and produce. Thus, they sometimes look to the stockist to assume the role of buyer. Some stockists mentioned that their cash flow is already depleted at the end of the planting season (having spent their working capital on inventory and having issued credit to many customers), and so they are unable to absorb the output produced. One stockist eloquently describes the nature of the dilemma:

“We have sensitized the farmers. They buy the seeds from you. When they plant, they get high yields. Then they also want to get [it to] the market, they turn to you – the stockist. (imitating the farmer) *Now you have sensitized us, we have planted this maize, we have got so much we want to sell - can you get us the market?* You see, they turn to us to find them markets for their produce.” (Stockist in Mbale)

AT Uganda worked with stockists to help them become purchasers of farm products as well as input sellers. Twenty-five percent of the stockists surveyed in 2006 offered that service.

Still, farmers face serious challenges in marketing their products (this is discussed further in the farmer overview section below). The market structure in rural Uganda suffers from key infrastructural problems, fails to fully stimulate farmer participation in the market, does not facilitate efficient sales of farm produce, and ultimately, diminishes the effectiveness of those actors operating in the input supply chain.

2.C. Profile of Study Participants: Large and Small Scale Farmers

Farmers were surveyed to measure the impacts of AT Uganda's BDS work with stockists on the stockists' main customers. Farmers in Mbale and Masindi tend to have highly diversified crop mixes. Crops that surveyed farmers mentioned growing include (in order of frequency mentioned) maize, beans, cassava, sweet potato, groundnuts (peanuts), banana and plantain, finger millet, coffee, tomatoes, onions, sunflowers, cabbages, soy beans, Irish potatoes, sorghum, rice, sugar cane, leafy greens, trees fruits, cotton, pigeon peas, tobacco, and pineapple. While most farmers buy at least some seeds, relatively few buy pesticides, fertilizers or herbicides.

Before going into the specifics of the farmer sample, it is important to set the context of the environment in which farmers and stockists live and work. Two of the factors that, on the one hand, the project was designed to address and, on the other hand, have bearing on the project's impacts are the central facts of poverty and market isolation.

In 2003, the per capita income of Ugandans was \$330, with 9.5 million people living on less than a dollar a day - 38% of Ugandans lived below the poverty level in 2002.¹² Ninety-six percent of all farmers surveyed said that they would have wanted to use more purchased inputs than they did. Fifty-eight percent said that they could not purchase additional inputs because they did not have enough cash available when inputs were needed. Although Uganda does have a bi-modal rainy season and two cropping seasons, the times of harvest sales and the times when inputs are needed do not overlap well. In addition, other cash expenses, such as school uniforms and fees, occur at the same time that many inputs should be purchased (which leads to a direct competition between such family goals as educating children for the future and growing crops for the coming year). Still, the timing of cash needs is not the full problem; 47% of farmers said that they can't afford to buy additional inputs (don't ever have the cash) at all. The only other reason for not accessing additional inputs that was cited by more than 5% of farmers was lack of land, which is in itself another aspect of lack of finances to improve production.

2.C.1. Farmer Sample

In 2006 a random sample of 153 farmers was conducted. Half of the people interviewed were men farmers and half were women farmers. Eighty-one lived in the district of Mbale, and 74 lived in the district of Masindi. The 69 households which had access to less than 5 acres (including land owned and rented) were categorized as "small farmers" while the 86 households that owned/operated 5 acres or more were categorized as "large farmers."¹³ The mean size of a small farm was 2.5 acres and the mean size for a large farm was 9.1 acres. This sample was largely a sub-sample of the 2003 survey in which a random sample of 349 farmers were surveyed.

As described above in the Methodology section, the 2003 farmer sample was drawn based on location, including proximity to a stockist who participated in the AT Uganda training or a control group stockist. However, because the means by which farmers choose stockists and the means by which stockists influence farmers' are complex, the data analysis showed that fewer farmers than expected shopped with stockist nearest to them. Table 9 below illustrate the extent to which factors other than proximity affect farmers' choice of stockist. It also shows how the experimental and control groups of farmers are defined. In a

¹² USAID. Budget: Uganda. <http://www.usaid.gov/policy/budget/cni2005/afr/ug/html>. (accessed May 30, 2007).

¹³ In consultation with officials in the District Departments of Agriculture, the research team defined "small farm" as less than five acres and "large farm" as more than five acres. Note that not all of the owned and rented land was necessarily under cultivation in 2006; the 5 acres include land under cultivation, grazing land, and fallow land. The actual amounts under cultivation in 2006 ranged from .25 acres to 4.75 acres for those categorized as small farmers and from 1.5 to 40 acres for "large farmers." Of the nine "large" farmers who cultivated less than three acres of their land, seven had allocated land for grazing (animals being, in general, a sign of wealth in Uganda) and all had land under fallow. As such, farm size is being used as a relative proxy for one aspect of economic status.

nutshell, for this research, experimental farmers are categorized as those who shop with an experimental stockist (that is, with stockists who participated in the AT Uganda project).¹⁴

- 1) Experimental Group Farmers
 - a. live in a village or town near where a stockist who has participated in the AT Uganda program is located and shop with that participating stockist OR
 - b. live in a village or town near where a non-participating (control) stockist is located and do not shop with that stockist but do travel to shop with a participating stockist
- 2) Control Group Farmers
 - a. live in a village or town near where a participating stockist is located and do not shop with that participating stockist but shop with a non-participating stockist or buy inputs from market vendors, neighbors, or other sources OR
 - b. live in a village or town near where a control stockist is located and shop with that control stockist or make purchases from other sources

Table 9: 2006 Farmer Sample: by Gender, Farm Size and Experimental/Control Category

Gender	Farm Size	Farmer Category						Total
		Experimental Group			Control Group			
		Experimental Stockist and Village	Experimental Stockist & Control Village	Total	Control Stockist (or Other Source) and Control Village	Control Stockist (or Other Source) & Experimental Village	Total	
Men	Small	10	10		10	15		43
	Large	7	7		7	7		33
	<i>Total</i>	<i>17</i>	<i>17</i>		<i>17</i>	<i>22</i>		76
Women	Small	2	16		16	2		41
	Large	7	9		12	7		36
	<i>Total</i>	<i>9</i>	<i>25</i>		<i>28</i>	<i>9</i>		77
	Total	27	42		50	27		153

There was no significant difference between the experimental and control groups in terms of age, education level or household size. Neither was there any significant difference in their farm characteristics including the amount of land they owned and/or rented or the number of people who worked on their farm with them. However, one element of note from the table is that it appears that fewer of the surveyed women shop with the stockists who were trained by the project.

The average age of the farmers surveyed is 45, and 84% are married. The mean number of family members living in the respondents' household is 6.7, and the mean number of children is 4.6. (Note that the mean household size of rural stockists is 7.6).

Fifty-eight percent of farmers surveyed have a primary education, and 28% have completed secondary (ordinary level) education. Forty-nine percent of the farmers surveyed live in a 'peri-urban' setting (in or within 5 kilometers of the large towns of Mbale and Masindi), 13% live in or near a small town or trading center, and 38% live in a rural village.

¹⁴ It is worthy of note that farmers who lived near a participating stockist may have been influenced by him or her even though the farmers did not make purchases at that nearby shop. However, it can be expected that farmers would be *more* influenced by the person they actually buy things from than by someone they did not. As such, this definition of control and experimental farmers best fits the research goals.

An overwhelming majority of all farmers (97%), responded that they used family and/or unpaid seasonal labor on their farms (See Table 12 below). Forty-five percent of farmers paid full time or seasonal laborers. Sixty-five percent of small farmers reported that family/unpaid labor was their only labor source. Large farms were slightly less reliant on unpaid labor: 62% of *large* farms surveyed reported that they used only family/unpaid seasonal labor. All large farmers who engage a full-time man and/or woman worker or hire a seasonal male worker do so *in addition to family labor*. This is a potentially important shift from 2003: there is now greater reliance on seasonal labor and less on full time labor. In addition, more people with large farms are now fully dependent on family and unpaid labor than were in 2003.

Table 10: Characteristics of the Employment Structure of Large and Small Farms

Type of Labor used on Farm	% of Small or Large Farms with this Labor Type†					
	Small		Large		Total	
	2003	2006	2003	2006	2003	2006
Any paid full time or seasonal labor	29%	35%	58%	28%	44%	45%
Full-time paid male employee	11%	4%	25%	9%	18%	7%
Full-time female paid employee	6%	1%	5%	7%	6%	5%
Seasonal paid male labor	14%	28%	38%	42%	26%	35%
Seasonal paid female labor	11%	19%	23%	30%	17%	23%
Family or unpaid seasonal labor <i>only</i>	71%	65%	42%	62%	56%	55%

† Note that farmers may use more than one type of labor on their farm – therefore these percentages do not sum to 100%.

Forty-six percent of the entire sample said that other people living in their household members worked off farm and earned income. Those surveyed were provided with a list of various work options from which to choose, and the highest ranking was ‘involvement in trade/enterprise activities’ (28% in 2006 & 33% in 2003), followed by wage labor (14% in 2006 & 16% in 2003), and salaried employment (12% in 2006 & 19% in 2003). Only 3.9% (11.5% in 2003) said that they receive rents from property as a source of income, 9.1% reported receiving earnings from gifts/remittances (22.5% in 2003), and 5.2% reported having income from savings/monthly interest (23.5% in 2003). It appears that farmers’ household incomes are becoming less diversified and that they are becoming increasingly dependent on farming itself. This may point to a larger economic trend in this part of Uganda.

2.C.2. Farmers’ Use of Agricultural Inputs

As noted above, cash availability is a severe constraint on many farmers. Still most farmers did buy seed: 87% of farmers bought seed in 2003 and 99% bought seed in 2006. While they did purchase seed, 90% of farmers surveyed in 2006 saved part of their own production to use as seed. The data does not distinguish between “improved seed” and local (or “ordinary”) seed, so it is not possible to identify the farmers who shifted to purchasing the improved seed. However, an increase in the number of types of seed purchased and (to a lesser extent) an increase in the amount spent on seed may correlate with such a shift. Because of this, in the analysis presented in this report, seed purchases are often examined separately from other input purchases. At the same time, because so few farmers bought agrochemicals, agrochemicals and seeds are often aggregated as “agricultural inputs” for the purposes of the analysis. It appears from this analysis that agrochemical purchases may constitute a second tier purchase, one which is more discretionary than the purchase of the seeds needed to get crops into the ground.

Table 13 presents a broad view of change in input purchases over the past three years. It appears that more farmers are buying pesticides and fertilizers (though those that do buy fertilizers may be decreasing their use of them). There were significant differences in both the change in the average number of types of seeds that

farmers purchased and in the average percent change in the mean amount that they spent on seeds. Table 14 below disaggregates this for farmers who shop with stockists who participated in the AT Uganda trainings and farmers who shopped elsewhere.

Table 11: Change in Purchases of Seeds and Agrochemicals (for those who did purchase the item)

	2003			2006			Change	
	% of Farmers who Buy	Mean # Types Bought	Mean Amount Spent †	% of Farmers who Buy	Mean # Types Bought	Mean Amount Spent	Change in Mean # of Types Bought	% Change in Mean Amount Spent
Seeds	87%	2.30	\$26.87	99%	3.12	\$37.60	.82**	40%**
Fertilizers	7.8%	1.08	\$75.82	16%	1.42	\$66.92	.34	-12%
Pesticides	8.4%	1.00	\$12.61	26%	1.12	\$22.11	.12	75%
Herbicides§	0.7%	1.00	\$10.84	3%	1.00	\$56.77	.00	532%

† in 2006 US\$ adjusted for inflation

§ In the interpretation of the change in herbicide purchases, it is important to note that one of the 4 farmers who did purchase herbicides spent US\$207. This strongly skews the results.

- Independent samples T-test: ** indicates a significant difference at the 0.01 level.
* indicates a significant difference at the 0.05 level.

Table 12: Agricultural Inputs Used by Farmers¹⁵

Agricultural Inputs Used	2003	2006		
	% of All Farmers using This Input	% of All Farmers using This Input	% Farmers who do Not Shop with AT Uganda-trained Stockists Using This (control farmers)	% Farmers who Shop with AT Uganda-trained Stockists Using This (experimental farmers)
Seeds	91%	99%	99%	100%
Fertilizers	8%	18%	9%	31%
Pesticides	9%	26%	11%	40%
Herbicides	0.7%	3%	0%	8%
Equipment and tools	54%	56%	57%	56%
Animal feed	16%	8%	7%	10%
Animal Drugs	33%	42%	37%	52%

¹⁵ Note that the two highest ranking inputs sold by stockists are 1) seeds and 2) pesticides. An AT Uganda staff member reported that “hardware stores and market traders sell most of the tools, and sellers of animal drugs and animal feeds are specialized (required by Ugandan law to have a vet in their employ and not able to sell chemicals or treated seed in the same shop). Hence the stockists who were interviewed generally do not sell significant quantities of these two categories.” In concordance, this analysis does not go into depth on tools or inputs for animals.

2.C.3. Selling Farm Products

Many farmers don't produce large surpluses that can be marketed. Ten percent of the farmers surveyed consumed between 90 and 100% of all the crops they produced.¹⁶ Eight of those farmers (5.6%) consumed between 98 and 100% of their agricultural production. Twenty-two percent of small farmers report that they consume 76-100% of their farm products within the household (down from 32% in 2003).

It appears to have become easier to sell agricultural produce over the last three years. When respondents were asked what degree of facility they experienced when selling their produce in the market during peak season, 88% of all farmers said that it was "easy" or "very easy" to find buyers. While in 2003 17% of small farmers said that finding buyers was "somewhat difficult" and 10% said that it was "very difficult," in 2006 just 7% of small farmers reported that it was difficult and 1% that it was "very difficult." In 2003 18% of large farmers' answered that selling their farm products is "somewhat difficult" (7% in 2006), and 15% said that finding buyers was "very difficult" (8% in 2006).

2.C.4. Input Sources

Farmers purchase inputs from a variety of sources (such as at markets and from their neighbors), not just stockists. A series of survey questions elicited information on which factors were important to farmers when selecting an outlet from which to purchase inputs. Fourteen percent of the farmers surveyed stated that they had recently changed outlets. When farmers were asked for their reasons for changing outlets, the most common response was dissatisfaction with product quality (55% of those who changed and 7% of all those surveyed).

2.C.5. Access to Services and Training

Farmer access to and use of services aimed at increasing agricultural output were limited in scope in 2003. Table 13 presents the types of agricultural services farmers say they have received since then. The most common agricultural business service that farmers used was advice on input use (30% of farmers surveyed).

Table 13: Farmers' Access to and Use of Services

	% of Farmers Accessing this Service
Advice on Input Use	30%
Visited Demonstration Plot	21%
Information on Market Prices	10%
Formal Training	9%
Information on Places to Market Products	8%
Stockist Purchased my Products	2%

¹⁶ The percentages in this section are calculated based on the total weight of crops produced. This is not a measure of the value of the farmers' production, but it does serve to give an approximation of the farmers' level of dependence on his or her crops for household subsistence vs. level of overall integration in the agricultural market economy. The prices that farmers said that they got for their crops ranged so widely (based on distance to a point of sale, quality of the production and time of year of sale) that it was not possible to compute an accurate average sales price to use to estimate the value of production that was eaten within the household, saved for seed or given away.

VI. FACTORS AFFECTING THE IMPACTS OF BDS: TESTING THE RESEARCH HYPOTHESES

1. LARGE SCALE WHOLESALERS, DISTRIBUTORS, AND SEED PRODUCERS

Thirteen large-scale suppliers were interviewed. Ten of these were primarily wholesalers and/or distributors and three were seed producers. Three of the large-scale businesses also participated in in-depth qualitative interviews, and much of the information reported here is from those. As no statistical tests are possible at this sample size, all information here is anecdotal and no firm conclusions can be drawn. However, qualitative data sheds light on what wholesalers/distributors experience while participating in the agricultural inputs supply market and provides an important window into the impacts of the project up into the input supply value chain.

Hypothesis 1: Suppliers and Distributors: Training and credit access for retailers will lead to suppliers and distributors experiencing increased demands for their products and varying their products and services to capture new markets.

Hypothesis 1.A. Demand for products and services from trained stockists will increase

Results. Inconclusive.

While most businesses saw increased sales, it was not possible to distinguish what portion of that increase was due to stockist training. *The small number of businesses does not allow for statistical testing.*

The six businesses that reported estimated sales for both 2003 and 2006 all reported an increase in sales over the period. After adjusting for inflation, the number of businesses reporting increases dropped to five, and their increases ranged from a modest 14% to a nearly eight-fold increase (See Table 14). While one said in an in-depth interview that increased sales are “due to more demand from farmers and stockists for improved inputs,” it was not possible to distinguish what portion of that increase was due to stockist training. However, in an in-depth interview, a representative of FICA, a seed producer based in Kamapala, did note that training for stockists could be a contributing factor in their increased sales:

Most stockists who purchase seed and other inputs from FICA have joined agro-input dealers associations such as UNADA.¹⁷ These associations are enabling the stockists to acquire training in their business, market information, as well as credit through the credit guarantee schemes operated by the associations. In that respect, FICA acknowledges that this could be contributing to the increasing purchases and sales made by the stockists (especially FICA’s customers).

¹⁷ UNADA is the stockist association which the AT Uganda project supported and through which trainings were offered.

Table 14: Change in Income between 2003 and 2006: Frequency Distribution for Gross Sales for Large Scale Seed Producers and Wholesalers/Distributors*

Type of Business	Years in Business	Estimated Yearly Sales in US Dollars		Percent growth in Sales	Percent growth in Sales (<i>Adjusted for Inflation</i>)
		2003	2006		
Seed Producer	4	2,311,800	4,623,500	100%	41%
Seed Producer	10	1,187,600	3,562,900	200%	91%
Seed Producer	6	332,500	4,061,800	1120%	772%
Input Wholesaler/Distributor	4	2,969,100	3,266,000	10%	-0.04%
Input Wholesaler/Distributor	12	226,300	337,800	50%	14%
Input Wholesaler/Distributor	6	1,578,600	2,367,900	50%	14%

* Six of the thirteen businesses surveyed provided sales figures for both 2003 and 2006.

Another window on the impact of stockist training and their demand for goods and services from suppliers can be found in the section *Difference in Demand as measured by Income from Sales and Cost of Inventory* (See Hypothesis 2.A. below). According to that data, however, stockists who were trained by the project had a lower increase in purchases than did stockists who did not receive training from the project.

Hypothesis 1.B. Stockist access to credit will reduce sales of distributors who offer informal credit (as stockists have options to purchase from suppliers they prefer)

Results. Inconclusive.

Due to the small number of large-scale suppliers, statistical testing is not possible.

One large-scale supplier reported anecdotally that the business' sales had fallen because it was not able to offer credit and was losing stockist customers to businesses that could offer credit.

Another one of the large-scale suppliers who participated in an in-depth interview did not offer credit or delayed payment to its customers. Strikingly, the reason that they were unable to do so was because so many stockists had failed to repay loans in the past that their business had been crippled and is now in debt itself. According to the representative of that business, "This problem arose mainly owing to several stockists obtaining inputs on credit and failing to repay or hiding or even changing premises causing the company to incur huge debts that have bogged them down and almost led to the closure of the enterprise." It is as a result of this, he said, that "the company can not offer credit to customers owing to the past bad experience. This implies that most stockists go elsewhere where they can access items on credit or on deferred payments." This experience would give credence to the hypothesis. Indeed, this firm said that it was in part due to the project-supported credit guarantee program that they themselves were able to obtain some credit to stay afloat.

Another distributor in Mbale pointed out that the problem of defaults on loans has a cyclical nature that has a negative impact on farmers as well:

When distributors delay in remitting funds for previous supplies, and since they cannot be provided with new stock before paying up, the ultimate clients - farmers- who purchase from distributors and stockists end up not accessing inputs in time.

Large-scale suppliers seemed to consider credit a critical factor in both their own business and stockists' business. However, offering credit to client stockists appears to be seen as a mixed bag. All but two of the 13 businesses surveyed offered credit to stockists to help make their purchases possible. As mentioned above, of

the two that did not offer credit, one did not because it had nearly gone out of business due to defaults on credit given to stockist customers.

In 2003, all four suppliers who participated in in-depth interviews mentioned that stockists “lack financing” or are unable to provide the cash in advance to purchase inputs. Some were reluctant to provide credit themselves. One who was based in Kampala said:

Those running the stores [stockists] are ill-trained in seeds and lack financing, and I do not provide credit to many intermediary stockists, because they are untrustworthy. Only to trusted ones [will I give credit].

In 2006, this situation had changed. All three of the large-scale suppliers who participated in in-depth interviews mentioned that the credit guarantee program supported by the project and operated through UNADA had been beneficial to stockists. A seed producer in Mbale said that

Over the last three years, it has become easier for stockists to access inputs on credit or with delayed payments opportunities - especially under UNADA. In addition, stockists have also been able to gain in that sales have increased. Profits also increased due to the fact that they are able to make large scale purchases on credit and enjoy the associated benefits of less costs due to bulk purchase – something that would not be possible with their limited capital base.

Still, even this credit guarantee program did not eliminate the suppliers’ risks in extending credit. One wholesaler said that while they had supplied inputs to stockists under the credit guarantee program, many stockists were not able to participate as they “do not have enough money to clear the 50%” payment required. Even those who did cross that barrier “sometimes take long to remit the money.” As another large-scale provider put it, we provide credit

especially to UNADA stockists and other regular and trustworthy customers whose details are known. This has contributed to increased sales by the company. However, while this arrangement has increased sales, it has a downside in that it exposed the seed company to losses since some customers fail to pay then either hide or change premises. In addition, there are some who delay to pay the loans causing unnecessary shortage of cash to the company.

Another distributor described some of the difficulties of working with credit and cited stockists’ membership in UNADA as a benefit, not only because access to credit allowed stockists to purchase more inventory from him, but also because it made it easier for him to recover the money loaned out:

Some stockists take seeds in bulk and on credit then later call the seed company to pick them up after some time claiming the seeds have not been purchased and are not likely to be taken and therefore the seed company should take them back. This results into losses. Some stockists also disappear without paying debts. Other stockists delay so much beyond the agreed repayment period thereby causing the company to experience losses. These problems have not changed much over the last three years although under UNADA it is easier to trace some of the stockists and recover funds from them.

Hypothesis 1.C. Distributors who face losing customers will vary and/or improve their products and services

Results. Inconclusive.

Statistical testing is not possible because of the small number of large-scale suppliers.

It was not possible to determine whether or not distributors who face losing customers varied or improved their products and services. It appears that some large-scale suppliers did increase the variety of goods and products sold (See Table 15 below), but it was not possible to securely attribute any change in products and services offered to competition from other suppliers who were more able to offer credit.

All of the businesses interviewed in 2006 said that they offered advice for free to their clients, and 11 of the 13 offered formal training. Almost all of them (12 of 13) operated demonstration plots and offered product promotions and discount prices. All but two (both of them seed producers) sold pesticides and herbicides. Nine offered fertilizers and/or seeds. Of the 14 most common products and services (listed in Table 15 below), the average number of products and services offered is 10.5. The data suggests that these businesses not only provide agricultural inputs, but also provide a basic level of support to the stockists within their network.

Table 15: Products & Services Offered by Businesses that Supply Stockists: 2003 & 2006¹⁸

Products and Services Offered	2003: % of Businesses Offering the Product or Service (n=10)	2006: % of Businesses Offering the Product or Service (n=13)
Seeds	80%	69%
Fertilizers	70%	69%
Pesticides	60%	85%
Herbicides	60%	85%
Tools and Equipment	50%	46%
Demonstration Plots	80%	92%
Product Promotions	80%	92%
Discount Prices	60%	92%
Information on Marketing	50%	62%
Transport of Bulk Purchases	30%	8%
Advice on Using Inputs	not reported	100%
Printed information on input use	not reported	62%
Formal Training	not reported	85%
Credit for Stockists	90%	85%

- *The number of large-scale businesses was not large enough to allow for statistical significance to be determined. None of the differences reported here are statistically significant.*

¹⁸ Note that the some of the businesses interviewed in 2003 were not interviewed in 2006 and visa versa. Thus this section does not provide correlated information on change in business practices.

2. STOCKISTS

Hypothesis 2: Training of Input Retailers will lead to increased demand for their products and services

Hypothesis 2A: BDS training leads to increased demand for stockists' products and services

Results.¹⁹ Inconclusive.

Note that the number of surveyed stockists who were in business in 2003 is too small to allow for statistical testing of a number of aspects of this hypothesis.

- Stockists who participated in the AT Uganda trainings do not have significantly more customers (*difference found was not significant: test of independent means*)
- Stockists who received BDS training had significantly higher costs for the first season of 2006 and for the entire year. (*significant difference: test of independent means*)
- Stockists who participated in the AT Uganda trainings
 - *appear* to have higher income from sales of improved seed, pesticides and fungicides, and small tools (*not statistically significant: n too small for testing*)
 - *appear* to have a smaller *increase* in sales of improved seed, pesticides and fungicides (*not statistically significant: n too small for testing*)
 - *appear* to have lower yearly sales and a lower change in yearly sales (*not statistically significant: n too small for testing*)
 - *appear* to have a smaller *increase* in expenditure on input inventory (*not statistically significant: n too small for testing*)
 - *appear* to have different patterns in sales of specific agricultural input products (*not statistically significant: n too small for testing*)

Data. Based on mean statistics, the stockists who participated in the AT Uganda project do appear to have a lower increase in inflation-adjusted sales of agricultural inputs between 2003 and 2006 and do appear to have different patterns in sales of specific agricultural input products than those who did not. However, because of the broad range of size of stockists (as measured by sales) and the small number of stockists who were in business in 2003, there are only a few potentially statistically significant differences between stockists trained by AT Uganda and those who did not receive AT Uganda training. All of these are in found in demand as measured by income from sales. Two other measures of increased demand were also explored: 1) difference in demand for specific inputs and 2) difference in demand as measured by number of customers. Results for all three of these types of measures can be founding the sections below.²⁰

Difference in Demand as measured by Income from Sales and Cost of Inventory:

Trained stockists had significantly higher costs for the first season of 2006 and for the entire year (see Table 16 below). Stockists who did not receive training from AT Uganda appear to have a higher *increase* in income from their *second season* sales of *agricultural inputs* between 2003 and 2006. Stockists not trained by AT Uganda

¹⁹ For the hypotheses in this report, when statistically significant results were found, they are underlined immediately below the relevant hypothesis itself. Where statistical significance was not possible to determine due to sample size, the apparent possible response to the hypothesis is noted, but is not underlined.

²⁰ All of the tests for this hypothesis this section were performed after removing the 2 outlier stockists with 2006 sales that were higher than 4 standard deviations above the mean. The relationships described here also held true when the 1 additional stockist (for a total of 3 stockists) with 2006 sales greater than 2 standard deviations above the mean (10 times the median sales) were excluded.

also appear to have a larger change in estimated *overall sales* in the most recent *two agricultural seasons* and the corresponding seasons in 2003. These differences were less pronounced when inflation was factored in.²¹

Table 16: Relationships among Stockists' Sales, Costs and Profits

	Control					AT Uganda Participants				
	2003 N=24	2003 <i>inflation adjusted</i> N=24	2006 N=39	Change† N=24	Change† <i>inflation adjusted</i> N=24	2003 N=28	2003 <i>inflation adjusted</i> N=28	2006 N=32	Change † N=28	Change† <i>inflation adjusted</i> N=28
<i>All figures are in US\$</i>										
Second Season of 2006: 2006 Calculations										
Sales of Agricultural Inputs	2,455	2,911	3,493	1,092	636	3,008	3,567	3,305	638	79
Cost Value of Agricultural Inputs Purchased (inventory)§	6,518	7,730	10,667	5,281	4,024	6,231	7,389	5,634	968	2
Stockist Estimates for Input Business over last 2 Agricultural Seasons										
Estimated Sales	9,220	10,935	15,514	9,144	7,429	8,229	9,759	8,677	1,095	-435
Estimated Costs	6,712	7,960	11,062	5,916	4,667	5,986	7,100	6,459	1,000	-114
Profit (Estimated)	2,508	2,975	4,453	3,228	3,003	2,243	2,659	2,218	95	-106
Stockist Overall Estimates for the Last 12 Months										
Estimated Sales	9,299	11,029	12,565	4,366	2,636	8,134	9,647	8,344	808	-705
Estimated Costs	7,091	8,049	11,505	6,067	4,718	7,185	8,521	6,749	123	-114
Profit (Estimated)	2,209	2,620	1,060	-1,671	2,082	951	1,126	1,595	685	508

• The number of stockists in the *control* group in business in 2003 was *not* large enough to allow for statistical significance to be determined. None of the differences reported here are statistically significant.

• The top 3 outliers were removed.²²

• The numbers in bold may be significantly different (at the 0.05 level). However, the number of stockists is too small to allow robust statistical testing.

† Note that, because 19 of the surveyed stockists were not in business in 2003, there is an *n* of 71 stockists in the 2006 columns and an *n* of only 54 stockists in the 2003 and change over time columns. Therefore, the figures in the Change and Change Inflation Adjusted columns are not additive results of the 2003 and 2006 figures.

§ Note that the cost figures for 2006 may be misleading. The 2006 cost value of agricultural inputs purchased is the amount spent on the stockists' current inventory, and "sales" minus "cost value of inputs" is not the same as the profit margin over the sales price of goods sold. In addition, inventory is often purchased in bulk while sales are incremental, so inventory purchased for the year does not necessarily match well with sales in a particular season. Therefore, profits cannot be calculated meaningfully from the data. It is the relationship of these figures across time and across the control and experimental groups that is of interest rather than the ostensible numbers themselves.

²¹ Controlling for inflation is not completely accurate as agricultural inputs prices may not have changed at the same rate as overall inflation in Uganda (18.6% between 2003 and 2006).

²² The top 3 outliers (in terms of 2006 sales) were removed from this analysis - and from much of the analysis in this report. Two of these three stockists identify themselves as having participated in AT Uganda trainings. Their sales are so much higher than those of other stockists that they substantially change the results. For instance, including them in the calculations of mean income in 2006 shifts the mean income from \$3,305 (which is 5% less than the non-participants' mean sales) to \$9,033 (which is 159% more than the non-participants' sales).

There were no other potentially significant differences between participating and non-participating stockists in other measures of overall sales, total sales of agricultural inputs (whether estimated by respondents on a seasonal basis, estimated on an annual basis or calculated based on the information they provided on specific input products), estimated costs, or profits (calculated based on stockist estimates), change in sales, costs or profits, or in percentage change in sales, costs, or profits (whether or not inflation was factored in) for both the shilling/dollar amount of the change and the percentage change between 2003 and 2006.

Difference in Demand for Specific Inputs. AT Uganda-trained stockists *appear* to have higher income from sales of improved seed, pesticides and fungicides, and small tools. (*not statistically significant: n too small for testing.*)

There did *appear* to be some differences in second season sales patterns between the two groups of stockists, particularly in their changes in sales of *improved seed, pesticides and fungicides*, and *small tools*, with stockists participating in project-sponsored training selling more of these (see Table 17 below). However, the overall number of stockists who sell each specific input is quite low, and this precludes running statistical analyses on the individual input products.

It appears that participating stockists increased their mean income from sales of improved seeds by 93% between 2003 and 2006 while control stockists increased their income from improved seeds by 67%. Participating stockists' mean sales of improved seeds in the second season of 2006 were US\$ 4,425, while the control stockists mean sales were US\$ 3,418. Participating stockists increased their income from sales of pesticides and fungicides by 82% (2006 mean sales of US\$ 5,193), while control stockists' income from sales of these products dropped by 6% (mean 2006 sales of US\$ 1,178).

Table 17: Calculated Input Sales in the Second Agricultural Seasons of 2003 and 2006

<i>All figures are in \$US</i>	Control Group						AT Uganda Participants					
	% of Active Stockists Providing		Mean Income from Sales (US\$)			% Change in sales inflation adj.	% of Stockists Providing		Mean Income from Sales (US\$)			% Change in sales inflation adj.
	2003 n=28	2006 n=38	2003	2003 inflation adj.	2006		2003 n=30	2006 n=33	2003	2003 inflation adj.	2006	
Improved Seeds	57%	69%	1,727	2,048	3,418	67%	81%	76%	1,936	2,296	4,425	93%
Ordinary Seeds	7%	10%	174	206	875	324%	3%	3%	174	206	66	-68%
Fertilizers	36%	44%	1,824	2,164	2,019	-7%	58%	56%	1,929	2,288	2,561	12%
Pesticides & Fungicides	57%	64%	1,062	1,259	1,178	-6%	68%	59%	2,403	2,850	5,193	82%
Herbicides	7%	13%	586	695	730	5%	23%	44%	1,552	1,840	1,490	-19%
Small Tools	25%	36%	676	802	1,107	38%	23%	32%	413	490	1,496	205%
Sub-Total: Agricultural Inputs Only			6,049	7,174	9,327	30%			8,407	9,970	15,231	53%
Animal Drugs Only	21%	33%	4,231	5,018	2,336	-63%	13%	29%	622	737	742	1%
Total			10,280	12,192	11,663	-4%			9,088	10,777	16,089	49%

- The number of stockists in the *control* group in business in 2003 was *not* large enough to allow for statistical significance to be determined. None of the differences reported here are statistically significant.
- The highest values in Sales and in % Change in Sales are noted in bold.

*Difference in Demand as measured by Number of Customers.*²³

- Stockists trained by AT Uganda do not have significantly more customers than their counterparts who did not receive training. (*difference found was not significant: test of independent means*)

There is no significant difference between the stockists who did and did not participate in AT Uganda trainings (or any other trainings) in regard to the number of customers that he or she had in 2006 (an average of 509 for participants and 432 for non-participants), the change in number of customers between 2003 and 2006 (242 for participants and 239 for non-participants), or in the percentage change in number of customers.

There is no correlation between the number of trainings that a stockist has participated in and the total number of customers that he or she has. Neither is there a correlation between the number of trainings attended and the overall change in number of customers between 2003 and 2006. This holds true whether only AT Uganda trainings are counted or whether all trainings from all sources are included. (See Table 18 below for the number of farmers using services offered by stockists.)

Stockists who have participated in AT Uganda trainings have a significantly higher percentage of women customers. Thirty-six percent of their customers are women while 22% of non-participants' customers are women.

Discussion. The low overall sales of stockists trained by the AT Uganda project need not be interpreted as a result of the training. Again, this is a correlation, and no directional causal link is implied. It could be that stockists who participated in the trainings felt more need of training and were not as well established as stockists as those who did not take advantage of the training opportunities. They may have been smaller stockists or newer to the business. The difference is not likely to lie in how focused their business is on sales of agricultural inputs vs. other products: the mean percentage of the business devoted to agricultural inputs is 76% for the non-participating stockists and 84% for participating stockists (not a significant difference).

It does appear, however, that more stockists who participated in AT Uganda trainings sell the types of inputs that were expected to promote increased farmer yields (improved seeds, pesticides and fungicides, and herbicides) - and they sell more of them. A woman stockist in Masindi who had participated in the AT Uganda BDS project summed things up saying, "Sales have increased due to increase in the number of customers as a result of increased farmer interest cultivated by demonstrations, adverts and good yields for the early adopters."

Hypothesis 2B: More BDS training leads to higher sales

Results. Hypotheses Generally Not Supported.

- For stockists below the 75th income percentile:
 - there was a positive correlation between the number of trainings a stockist attended and his or her sales of pesticides and fungicides (*statistically significant: correlation*)

²³ In this sub-section, the calculations were performed after removing the 3 outlier stockists with 2006 customer numbers that were higher than 4 times the mean number of customers (15 times the median number). While the changes in the prices of farming inputs may not have exactly tracked with Uganda's 18.6% overall inflation between 2003 and 2006, as an approximation, sales figures for 2003 have been translated into 2006 equivalents by making this 18.6% inflation adjustment.

- For all stockists surveyed:²⁴
 - The more BDS trainings a stockist has attended, the lower his or her overall yearly 2006 sales and change in sales since 2003 are likely to be. (*statistically significant: correlation*)
 - Stockists trained by AT Uganda have lower incomes in 2006 and lower changes in income since 2003 than stockists not trained by AT Uganda. (*statistically significant: test of independent means*)
 - There was no significant difference in income from sales of agricultural inputs by stockists who received training and those who did not. (*difference found was not significant: test of independent means*)

Data. The stockists below the 75th income percentile - those who earn more than 25,100,000 USh [Ugandan shillings – equivalent to US\$13,868] - did show some significant impacts of training. There was a positive correlation between the number of trainings attended and the amount the stockist earned in sales of pesticides and fungicides (Kendall's tau-b correlation coefficient of .268 with a significance of .035* [significant at the 95% confidence level]. This relationship held steady with and without controls for inflation. No other agricultural product or group of products showed a significant relationship. Neither did estimated profits or costs related to input sales.

Stockists who attend more BDS trainings do not appear to have higher sales than stockists who attended fewer trainings. There is a *negative* correlation between the number of AT Uganda trainings stockists participated in and their estimate of total sales (sales of all types of products) in 2006 (correlation coefficient of -.201*, significant at the 95% level). For stockists who were in business in both 2003 and 2006, there is a negative correlation between the number of AT Uganda trainings they attended and the change in their estimated total sales. There is no statistically significant correlation between the number of trainings attended and overall sales or sales of agricultural inputs only in 2006 or in the change between sales of those items in the second seasons of 2003 and 2006.

There is, however, a *negative* correlation between the number of AT Uganda trainings stockists participated in and their estimate of total sales (sales of all types of products) in 2006 (correlation coefficient of -.201*, significant at the 95% level). For stockists who were in business in both 2003 and 2006, there is a negative correlation between the number of AT Uganda trainings they attended and the change in their estimated total sales between 2003 and 2006. This holds true with adjustments for inflation (correlation coefficient of -.300, significant at the 95% level) and without adjustments for inflation (correlation coefficient of -.290, significant at the 95% level). This relationship remains the same when trainings from other sources beyond AT Uganda are included. T-tests also showed that those who did receive AT Uganda training cited lower total incomes over the last 2 seasons and lower changes in income between 2003 and 2006 than did those who did not receive training (significant at the 95% confidence level when equal variances were not assumed).

When all stockists surveyed were included, there were no statistically significant differences in calculated sales of agricultural inputs between stockists who did and who did not receive training (independent sample t-tests).

Discussion. The lack of statistically significant correlations in many areas of interest may simply be due to the high variability in overall sales of the stockists in the region surveyed. When stockists at the high and low end of sales were removed from the analysis, the number of stockists in the control and experimental groups became too small to run valid statistical tests of difference in mean sales between the groups for most of the factors of interest. This should not necessarily be taken to mean that there were no significant differences. It simply means that the range of variability in sales in the sample made it difficult to isolate those differences through statistical tests.

²⁴ This does not include the two outlier stockists surveyed who had very high 2006 sales (more than three standard deviations higher than the mean).

It may be that the increase in sales of pesticides and fungicides as the number of trainings increases shows up because this group of agrochemicals has a unique place in Ugandan farm economics. Agrochemicals in general, and pesticides and fungicides in particular, are expensive and volitional inputs, and few farmers chose to spend money on them. When farmers do choose to buy agrochemicals, they appear to start with pesticides and fungicides. However, effective use of pesticides and fungicides is dependent on factors such as timing, matching the correct product to the problem, weather, etc. Since they are difficult to use effectively, well trained stockists who understand how to use them and can communicate this well to farmers may be able to inspire confidence in farmers that their investment decision will pay off. Other agrochemical inputs are both less frequently used by farmers and simpler to use when purchased, so sound training for stockists may not have the same impact on farmer decisions.

2C: BDS trained stockists will offer wider variety of products and services

Results. Hypothesis Supported.

- Stockists who participated in AT Uganda training offered a wider variety of services. (*significant difference: test of independent means*)
- The more trainings a stockists attended, the wider the variety of products and services he or she offered (*significant difference: correlation*)
- Stockists who received training from AT Uganda *appear* to have had a greater percentage increase in the number of customers to whom they provide verbal advice. (*not statistically significant: n too small for testing*)

Data. The AT Uganda project supported stockists in a variety of aspects of selecting and promoting agricultural inputs and offering support services to customers. Stockists were asked about the following services that they might offer to farmers: verbal advice, demonstration plots, informal credit to farmers, discount prices, information on produce prices, information on places to market products, buying produce from farmers, formal training classes, and printed information. Products that stockists were asked about included improved seeds, ordinary seeds, fertilizers, pesticides & fungicides, herbicides, small tools, and animal feed and drugs.²⁵ Four elements of this hypothesis are explored here: 1) Difference in the total number of products and services offered; 2) Difference in the number of types of products provided; 3) Difference in number of services offered; and 4) Difference in number of people who use services provided by stockists.

Difference in the Total Number of Products and Services Offered

- The more trainings of any type that a stockist attends, the more types of products and services he or she offers. (*statistically significant: correlation*)

When all input products and services are taken together there is a positive correlation between the number of types of products and services offered by stockists and the number of trainings (whether from AT Uganda or any other source) that they had participated in (Kendall's tau_b correlation coefficient of .299 with a significance of .030 [significant at a 95% confidence level]). The positive correlation is stronger for the number of trainings and number of services offered by just those stockists who had been in business since before the project started (correlation coefficient of .320 with a significance of .006 [significant at a 99% confidence level]). See Tables 18 and 19 below for details.

²⁵ Note that stockists were also asked about equipment rental, which brought in very high earnings and required high capital investment. A very few stockists also mentioned that they provide storage. However, few stockists provided either of these, and those who did received very high amounts for those products and services, so information on rental and storage were not included here to avoid unnecessarily skewing the data.

When just trainings offered by AT Uganda are included, the correlations noted above are not statistically significant. The lack of a significant correlation between AT Uganda trainings specifically and the variety of products and services offered should not be taken to imply that the AT Uganda trainings were any less effective than trainings from other sources. Some of the trainings that respondents cited were offered by UNADA, which received targeted support from the project. Other trainings cited by farmers were offered by other NGOs, and training content and quality is beyond the scope of this research. Rather, these results suggest that training itself has an important impact on stockists' choice of products and types of services that they are able to offer their clients.

Difference in the Number of Types of Products Provided²⁶

- AT Uganda participants *appear* to have increased the number of varieties of pesticides and fungicides and the number of types of small tools that they sell. (*not statistically significant: n too small for testing*)

The differences that call attention to themselves are not so much in the overall number of input products that participating and non-participating stockists sell, but in *which* products they sell. It also appears that more participating stockists may have begun to sell herbicides. See Table 18 below for details.

Table 18: Varieties of Crop Inputs during the Second Agricultural Season

Input Products	Control Group					AT Uganda Participants					Difference between Control and AT Uganda Participants in 2006	
	% of Active Stockists Providing This		Mean # of Varieties Sold		% Change in #	% of Active Stockists Providing This		Mean # of Varieties Sold		% Change in #		
	2003 n=28	2006 n=39	2003	2006		2003 n=31	2006 n=34	2003	2006		Change in #	% Difference
Improved Seeds	57%	69%	4.3	5.1	19%	81%	76%	4.5	6.3	40%	1.2	24%
Ordinary Seeds	7%	10%	2.5	1.8	-28%	3%	3%	3.0	1.0	-67%	-.8	-44%
Fertilizers	36%	44%	3.2	3.8	19%	58%	56%	3.7	4.1	11%	0.3	8%
Pesticides & Fungicides	57%	64%	4.8	5.5	15%	68%	59%	4.7	6.7	43%	1.2	22%
Herbicides	7%	13%	1.5	2.4	60%	23%	44%	3.6	3.2	-11%	1.7	71%
Small Tools	25%	36%	2.3	2.3	0%	23%	32%	2.6	3.3	27%	1.0	43%
Total			18.6	20.9	12%			22.1	24.6	11%	3.7	18%

- The number of stockists in the *control* group in business in 2003 was *not* large enough to allow for statistical significance to be determined. None of the differences reported here are statistically significant.
- The highest values in Mean # of Varieties Sold and in % Change in # of types are noted in bold.

Because relatively few stockists sold drugs and feed for animals and because these animal husbandry inputs generated very high income from sales, they are presented here in a separate table.

²⁶ All of the tests in this section were performed after removing one outlier stockist who cited providing verbal advice to 6000 customers (more than 10 times the adjusted mean number of customers who received advice).

Table 19: Varieties of Animal Inputs during the Second Agricultural Season

Input Products	Control Group					AT Uganda Participants					Difference between Control and AT Uganda Participants: 2006	
	% of Active Stockists Providing This		Mean # of Varieties Sold		% Change in #	% of Active Stockists Providing This		Mean # of Varieties Sold		% Change in #	Change in #	% Difference
	2003 n=28	2006 n=39	2003	2006		2003 n=31	2006 n=34	2003	2006			
Animal Feed	4%	8%	2.0	2.0	0%	6%	6%	2.0	1.5	-25%	-0.5	-25%
Animal Drugs	21%	33%	7.7	6.2	-19%	13%	29%	4.8	4.0	-17%	-2.2	-35%
Total			9.7	8.2	-15%			6.8	5.5	-19%	-2.7	-33%

- The number of stockists in the *control* group in business in 2003 was *not* large enough to allow for statistical significance to be determined. None of the differences reported here are statistically significant.
- The highest values in Mean # of Varieties Sold and in % Change in # of types are noted in bold.
- None of the differences in this table are statistically significant.

Difference in Number of Services Offered

- Stockists who participated in AT Uganda training offered a wider variety of services than those who did not. (significant difference: test of independent means)
- The more trainings a stockist received, the more types of services he or she offered. (statistically significant: correlation)

Stockists who received training from AT Uganda offered an average of 4.3 services in 2006, while control stockists offered an average of 2.7 services. The difference between these means is statistically significant at a 99% confidence level. There was also a significant difference in the number of services that they offered in 2003. (See Table 20 below.)

There was a positive correlation between number of trainings attended and number of types of services offered (correlation coefficient of .320 significant at the .006 level [99% confidence]). Without the top two outliers, the correlation is still significant (correlation coefficient of .287 significant at the .017 level [95% confidence]).

Table 20: Number of Services Offered by Stockists in 2003 and 2006

	Control Group	AT Uganda Participants
Mean Number of Services Offered in 2006	2.72	4.34**
Mean Number of Services Offered in 2003	2.22	4.14

- Independent samples t-test: ** indicates a significant difference at the 0.01 level.

As for the higher number of services offered by participating stockists in 2003,²⁷ since the project had already begun working with stockists when the survey was conducted in 2003, the stockists who had already participated in trainings at that time may have already added new customer services to their repertoire by the time the 2003 survey was conducted. A change in services offered could be an almost immediate change, while the change in sales and profits would be likely to lag somewhat as farmer purchases are directly linked to agricultural seasons and farmer decision-making. This could be evidence of stockists' increased ability to diversify and target needs. At the same time, it could also be that the stockists who chose to attend trainings

²⁷ The number of stockists offering services in 2003 was too small to test for statistical significance.

were also stockists who would already had a higher interest in customer service aspects of sales and, therefore, may already have been offering more types of services to the farmers who shopped with them.

*Difference in Number of People Who Use Services Provided by Stockists*²⁸

- Stockists who received training from AT Uganda *may have had* a greater percentage increase in the number of customers to whom they provide verbal advice. (*not statistically significant: n too small for testing*)

Between 2003 and 2006, stockists who received training from AT Uganda reported a mean 65% increase in the number of customers to whom they provide verbal advice. During the same period, the mean number of customers to whom control stockists gave advice slightly decreased (by 14%). This difference is almost statistically significant (t-test significance of .052 when equal variances are not assumed).

While the low numbers of stockists who offer most of these services preclude statistical tests on all other services offered by the stockists surveyed, it does appear that there may be some differences between those stockists who did and did not participate in at least one AT Uganda training re their business practices between 2003 and 2006. (See Table 21 below for details.) For instance, stockists who participated in the AT Uganda project appear to have increased their support for farmer marketing. Although only about one quarter of the stockists reported providing any one of these, the number of farmers to whom participating stockists provided information on farm product prices or places to market farm products appeared to increase more so than for non-participating stockists. The participating stockists also appear to have had a greater increase in the number of farmers from whom they purchase farm products.

Table 21: Number of People Accessing Services Offered by Control and Participant Stockists²⁹

Service Provided	Control Group					AT Uganda Participants				
	% of Active Stockists Providing This		Mean # of People who Used This		Mean % Change in # of people†	% of Stockists Providing This		Mean # of People who Used This		Mean % Change in # of people†
	2003 n=28	2006 n=38	2003	2006		2003 n=30	2006 n=33	2003	2006	
Verbal Advice	61%	100%	138	119	-2%	90%	97%	166	274	47%
Demonstration Plot	14%	26%	17	78	120%	77%	52%	74	128	90%
Informal Credit to Farmers	25%	45%	101	100	-23%	37%	52%	32	34	11%
Discount Prices	18%	16%	24	146	496%	30%	36%	32	53	170%
Information on Produce Prices	11%	13%	9	15	150%	27%	27%	99	232	96%
Information on Marketing Products	11%	11%	10	18	0%	17%	27%	47	13	70%
Bought Produce from Farmers	10%	29%	10	172	333%	23%	27%	27	107	219%
Formal Training	4%	8%	20	95	330%	3%	12%	30	142	40%
Printed Information	7%	11%	100	73	-50%	7%	12%	65	530	-44%

† Includes only those stockists who already offered the service in 2003.

- The number of stockists in the control group in business in 2003 was not large enough to allow for statistical significance to be determined. None of the differences reported here are statistically significant.

²⁸ All of the tests in this section were performed after removing one outlier stockist.

²⁹ The calculations in this table omit the following outliers: one stockist who cited extremely high numbers of customers served, one who did not provide information on services, and two who cited purchasing farm products from an extremely large number of farmers.

There may have been some service areas in which non-participating stockists adopted practices promoted by the project. For instance, while just 60% of control stockists said that they offered verbal advice to customers in 2003, all of them said that they did so in 2006. Also, while twice as many surveyed participating stockists had demonstration plots in 2006 than did control stockists, some control stockists appear to have started demonstration plots and to have increased the number of farmers who visit them.

The only service that fewer participating stockists provided in 2006 than in 2003 was demonstration plots. Since demonstration plots require on-going investments time and funds to continue to operate, it may be that project support was an important incentive for some of the stockists.

Hypothesis 3: Access to credit will significantly improve the products and services offered by retailers (in amount and quantity) and will result in an expanded market for the goods and services offered.

Hypothesis 3A: Membership in a credit guarantee association will increase access to credit from businesses besides wholesale distributors

Results. Inconclusive.

- More participating stockists accessed credit of any type than did non-participating stockists. (*significant difference: test of independent means*)
- Membership in the credit guarantee program supported by AT Uganda does **not** appear to increase access to credit from other sources. (*not statistically significant: n too small for testing*)

While participating stockists were more likely to access credit than non-participating stockists, the credit they accessed was largely credit from wholesale distributors that was facilitated by the project. Very few participating stockists accessed other types of credit.

Data. Nineteen of the stockists surveyed said that they participated in the AT Uganda credit guarantee program (56% of those surveyed who participated in the project). Twenty stockists said that they received informal credit from a distributor or supplier. Seven stockists said that they received formal credit directly from a formal credit institution (or from a large-scale distributor). One control stockist cited receiving both formal and informal credit. No stockists reported getting credit from all three types of sources. (See Table 22 below.)

Table 22: Cross-tabulation of types of Credit received by Stockists

Received Credit through the AT Uganda Credit Guarantee Program		Received Informal Credit directly from Distributors or Suppliers			
		No	Yes	Total	
No	Received Formal Credit directly from Distributors or Suppliers or Other Credit Institution	No	34	16	50
		Yes	3	1	4
		<i>Total</i>	37	17	54
Yes	Received Formal Credit directly from Distributors or Suppliers or Other Credit Institution	No	13	3	16
		Yes	3	0	3
		<i>Total</i>	16	3	19

Of the 54 stockists surveyed who did not participate in the AT Uganda credit guarantee program, 20 (37%) got credit from another source. Of the 19 stockists participating in the AT Uganda-supported credit

guarantee program, six accessed credit from other sources as well (these six represent 31.5% of those participating in the AT Uganda credit program and 17.6% of all experimental group stockists). It does not appear that participation in the credit guarantee program increased access to other sources of credit.

Three of these stockists received informal credit from suppliers or distributors where they purchased inputs: two of these stockists received their first informal credit from a supplier or distributor in the year following their initial participation in the AT Uganda program, and one stockist accessed the second type of credit in the same year. An additional three of the stockists who participated in the AT Uganda credit guarantee program said they received formal credit from a supplier or other institution: again, two of these stockists received their first formal credit in the year following their initial participation in the AT Uganda program, and one stockist accessed the second type of credit in the same year.

Fifteen of the stockists who received training from AT Uganda (44.1%) did not access credit through the AT Uganda credit guarantee program. However, of these, seven stockists (20.6%) did access credit from other sources.

Only 23.5% of the stockists participating in the AT Uganda project (8 people) did not access any type of credit between 2003 and 2006. By contrast, 62.5% of the non-participating stockists (25 people) did not use credit during that same time period. All told, 33 stockists (45% of all those surveyed), did not access any credit between 2003 and 2006.

Discussion. The most common benefit of access to credit cited by stockists was that “it helped me to increase my business stocks” (26 people). This was followed by “it enabled me to increase my income” (9 people), “it enabled me to increase volume of sales (8 people), and “it enabled me to reduce stocking frequency and associated transaction costs” (5 people).

Providing credit to stockists was seen as problematic by the wholesalers and distributors who participated in in-depth interviews. For the stockists themselves, credit seemed to have been a mixed blessing (see below).

Hypothesis 3B: Training with access to credit leads to higher sales and net profit

Results. *n too small for testing.*

- It does **not** appear that the stockists who received both credit and training had higher sales or profits than those did not receive both. (*not statistically significant: n too small for testing*)

Data. The hypothesis is not supported by the data. Indeed it appears that the tendency may be the opposite for some elements of business. The lack of statistically significant findings related to this hypothesis is in large part due to the high variability in sales and costs of the stockists in the sample. The only factors that approached significance were the 2003 costs – with those who did not receive the business supports of credit and training having higher costs in 2003. Still, the comparison of sales, costs and profits between the two groups appears to show a fairly consistent pattern.

Table 23 below provides the mean sales, costs and profits cited by the stockists who were interviewed. The table is set up to compare the mean business sales, costs and profits experienced by those who received both training and credit (the section on the right side of the table) with those experienced by stockists who did not receive both (the section on the left side of the table). Of the 42 stockists interviewed who did not receive both, 12 did participate in at least one training (with AT Uganda and/or with another training source), 10 received credit (from AT Uganda or from another source, and 20 received neither training nor credit.

Table 23: Sales and Profits of Stockists with Both Training and Credit

	Stockists <i>Without Both Training and Credit</i>					Stockists who <i>Received Both Training & Credit</i>				
	2003	2003 <i>inflation adjusted</i>	2006	Change†	Change† <i>inflation adjusted</i>	2003	2003 <i>inflation adjusted</i>	2006	Change†	Change† <i>inflation adjusted</i>
<i>All figures are Means All figures are in US\$</i>	N=26	N=26	N=42	N=26	N=26	N=27	N=27	N=28	N=27	N=27
Second Season of 2006 and 2003: Calculated										
Sales of Agricultural Inputs	3,231	3,832	3,452	512	-88	2,243	2,660	3,226	1,089	672
Cost Value of Agricultural Inputs Purchased (inventory)§	1,019	1,209	3,491	2,784	2,511	1,296	1,537	2,315	1,165	890
Stockist Estimates for Input Business over last 2 Agricultural Seasons										
Estimated Sales	12,224	14,498	14,729	5,915	3,641	6,100	7,234	9,287	3,425	2,290
Estimated Costs	10,048	11,917	11,030	3,342	1,473	3,813	4,522	6,559	2,908	2,199
Profit (Estimated)	2,176	2,580	3,699	2,573	2,378	2,287	2,712	2,728	517	312
Stockist Overall Estimates for the Last 12 Months										
Estimated Sales	12,647	14,999	12,176	1,226	-1,126	5,838	6,924	8,980	3,368	2,282
Estimated Costs	11,084	13,145	11,304	2,572	511	4,259	5,051	6,978	2,893	2,101
Profit (Estimated)	1,563	1,854	872	-1,346	-1,637	1,579	1,873	2,002	475	181

- The number of stockists in the *control* group in business in 2003 was *not* large enough to allow for statistical significance to be determined. None of the differences reported here are statistically significant.
- The highest values in each row are noted in bold.
- The top 2 outliers were removed.

† Note that, because 17 of the surveyed stockists were not in business in 2003, there is a total *n* of 70 stockists in the 2006 data and an *n* of only 53 stockists in the 2003 and change over time data. Therefore, the figures in the Change and Change Inflation Adjusted columns are not additive results of the 2003 and 2006 figures.

§ Note that it is not possible to accurately calculate profit for the second season of 2006. The 2006 cost value of agricultural inputs purchased is the amount spent on the stockists' current inventory, and sales minus costs value of inputs is not the same as the profit margin over the sales price of goods sold.

Discussion. Stockists who received both credit and training between 2003 and 2006 appear to have had *lower* costs in 2003 than those who did not. It appears that the stockists who did *not* receive both types of business support spent *more* on inventory and had *higher* volumes of sales in both 2003 and 2006. It is not known why this would be the case. This may suggest that those stockists who did not access credit had a high enough cash flow to be able to operate without credit. It may suggest that stockists with a smaller business had more need for credit. Alternatively, it may suggest that the cost of the credit posed a barrier to stockists.

While there was only one person in the group that received both credit and training who was not in business in 2003, 16 stockists (38%) of the remainder were not in business in 2003. This suggests that it may be harder for people with new businesses to get credit. At the same time, the high inventory costs in the group of stockists who did not have both types of business support may be related to the relatively large number of this group of respondents who were not in business in 2003. These stockists may still be building both inventory and client base.

Hypothesis 4: Stockist Demographics: Demographic characteristics will affect the degree to which retailers take advantage of training and new credit opportunities.³⁰

Of the 72 stockists surveyed, 64 were the owners of the shop. With 64 shop owners in the data set, it was not always possible to test statistical significance for all the variables of interest. In these cases, the sections on demographics provide information on apparent tendencies in the data.

Hypothesis 4A: Younger stockists will have higher increases in sales

Results. Hypothesis Partially Supported.

- Younger shop owners tend to have higher changes in overall yearly sales than older stockists. (statistically significant: Kendall's tau_b)
- Shop owners between the ages of 36 and 47 have significantly higher change in sales than stockists in both older and younger age groups. (significant difference in means: ANOVA: Tamhane's T2)

Data. There is a negative correlation between age and change between 2003 and 2006 in estimated sales - as well as in costs - over two agricultural seasons (based on Kendall's tau_b [nonparametric correlation calculation for populations that do not follow the normal distribution]) (See Table 24 below). However, when stockists are divided into three groups based on their age, those in the middle age group show significantly higher increase in sales (based on ANOVA post hoc Tamhane's T2 calculus of comparison among group means) (See Table 25 below).

Table 24: Correlation between Shop Owners' Age and Change in Sales, Costs and Profits from 2003 to 2006 (2003 figures not adjusted for inflation)

Correlations	Pearson Correlation	Kendall's tau_b
Age : Change in Agricultural Input Sales (calculated: second season of 2003 and second season of 2006)	--	--
Age : Change in Sales (estimated: past 2 seasons and corresponding seasons 3 years ago)	--	-.228* .030
Age : Change in Agricultural Input Costs (calculated: second season of 2003 and second season of 2006)	--	--
Age : Change in Costs (estimated: past 2 seasons and corresponding seasons 3 years ago)	--	-.238* .023
Age : Change in Profits (estimated: past 2 seasons and corresponding seasons 3 years ago)	--	--
Age : Change in # of types of products and services offered	--	--

- Kendall's tau_b: * denotes a statistically significant correlation at the 95% confidence level
- None of these are significant when 2003 figures are adjusted for inflation
- These calculations include shop owners who were in business in 2003 (top 3 outliers removed).
- The top number in each cell is the correlation coefficient. The bottom number in each cell is the level of significance.
- "Profit" here is simply agricultural input sales – cost value of inventory. It does not include other fixed costs.

It is important to note that, while the measures of change documented in Table 25 do show significance, when 2003 sales and costs were adjusted for inflation, there was no significant correlation between age and

³⁰ For this set of hypotheses related to stockist demographics, the sample size is 64. This is because the 7 respondents who were shop employees rather than owners have been removed from the analysis.

change in these measures of business activity. It may be relevant to note here that there is a positive correlation between age and the number of trainings attended by a shop owner who was in business in both 2003 and 2006 (Pearson’s correlation coefficient of .408, significant at the 99% confidence level). Still, it may have bearing on a link between training and sales.

When stockists were divided into four age groups and into two age groups, ANOVA tests showed no significant differences in age and change in financial aspects of the business. However, when stockists were divided in three groups by age, there were significant differences between stockists aged 36 – 47 and stockists aged 48 through 75 for the change in inflation-adjusted sales and inflation-adjusted costs (as estimated based on the most recent and two most recent agricultural seasons). As noted in Table 25 below, the stockists in the middle age-group (36-47) in general appeared to have higher increases in costs, sales and profits between 2003 and 2006 than did the younger stockists (ages 23-35) and the older stockists (ages 48-75). The older stockists tended to have declines in their inflation-adjusted business costs, sales and profits. Stockists in this central age group may also have increased the number of types of products and services that they offer more than did the stockists in the other two age groups. (See Table 24 below).

Table 25: Differences in Sales, Costs and Profits by Stockist Age Group

	Stockist Age Groups					
	23-35		36-47		48-75	
	Mean Change (US\$)	Mean Change (US\$) <i>Inflation adjusted</i>	Mean Change (US\$)	Mean Change (US\$) <i>Inflation adjusted</i>	Mean Change (US\$)	Mean Change (US\$) <i>Inflation adjusted</i>
Change in Agricultural Input Sales (calculated: second season of 2003 and second season of 2006)	362	-565	1536	1177	20	-539
Change in Sales (estimated: past 2 seasons and corresponding seasons 3 years ago)	6037	3042	9922	8629*	-380	-2235*
Change in Agricultural Input Costs (calculated: second season of 2003 and second season of 2006)	7078	5049	5277	4752*	-468	-1537*
Change in Costs (estimated: past 2 seasons and corresponding seasons 3 years ago)	5460	3067	5519	4967*	309	-1076*
Change in Profits (estimated: past 2 seasons and corresponding seasons 3 years ago)	578	267	4411	3838	-690	-939
Change in # of types of products and services offered	2.38		4.56		1.28	

- * denotes a statistically significant difference between the two groups, based on ANOVA post hoc Tamhane’s T2 comparisons between the groups at the 95% confidence level
- The n of 45 includes shop owners who were in business in 2003 and in 2006 (3 outliers removed).
- “Profit” here is simply agricultural input sales – cost value of inventory. It does not include other fixed costs.
- Age categories based on approximate division of the sample into thirds.
- The highest value in the category is in **bold**.
- The lowest value in the category is in *italics*.

Discussion. These results may reflect where stockists are in their own lives and in the lives of their businesses. For instance, in 2006 younger stockists appear to have both spent more on their business and earned more in sales than older stockists. However, their ultimate profits appeared to be similar. Stockists in the highest age group may have had additional life circumstances (such as health, declining availability of family labor, being already settled into their way of doing business, etc.) that may have contributed to their apparently less favorable business outcomes.

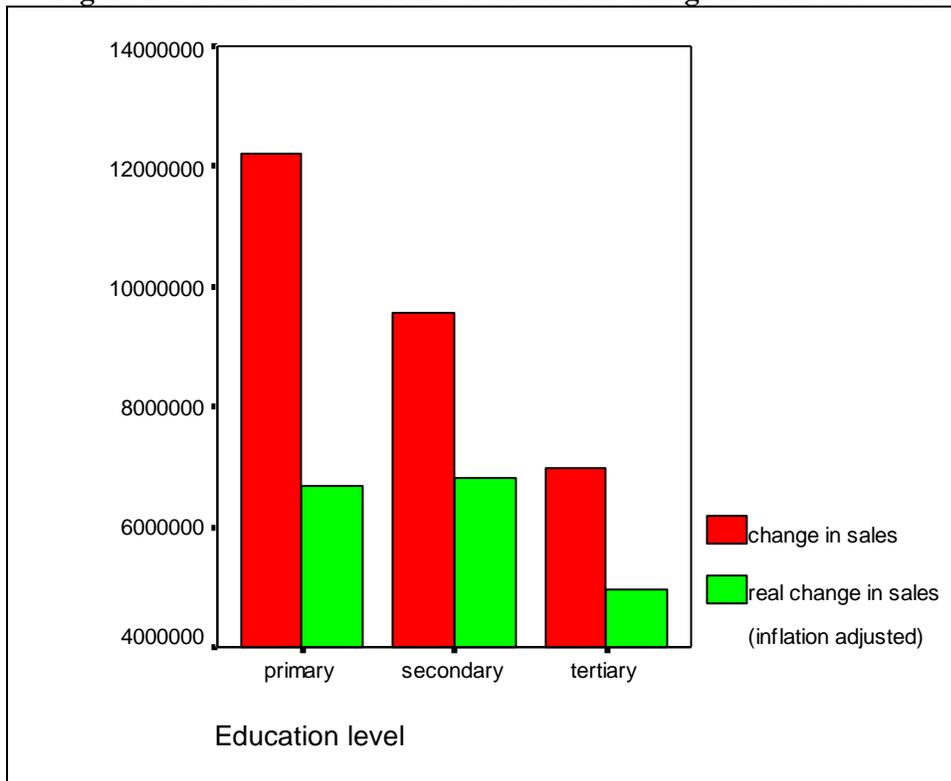
Hypothesis 4B: Better educated stockists will have higher increases in sales

Results. Hypothesis Not Supported.

- Better educated stockists did not have greater increases in sales between 2003 and 2006. (not statistically significant: correlation)

Data. If anything, the slope of the correlation coefficient, while slight, *appeared* to be negative, with stockists with lower levels of education tending to show higher increases in sales. While the data do not support drawing this as conclusion, an overview of the data on mean change in sales appears to show that stockists whose highest level of education was primary school may have had higher changes in sales in the last three years. This apparently possible relationship was similar when a variety of measures of sales, profits, and changes in sales were examined.

Figure 1: Stockist Education Level and Mean Change in Sales between 2003 and 2006



There is one item related to this hypothesis which did show significant difference in ANOVA tests. Stockists with just primary education sold more categories of agricultural inputs products in 2006 than those with tertiary education. Stockists with only primary education sold an average of 3.7 different types of agricultural

inputs (improved seeds, ordinary seeds, fertilizers, pesticides, etc.), while those with tertiary education sold an average of 2.5 types of agricultural inputs.

Discussion. Aside from the difficulties inherent in drawing conclusions from data with such high variability, it is also difficult to draw conclusions about the “meaning” of education in terms of levels of business skills or savvy, entrepreneurial abilities, intelligence, drive or other common connotations that we tend to associate with higher and lower education levels in western societies. In rural Uganda, the opportunity to attend primary school, much less secondary school or beyond, is currently limited by distance from the nearest school, family ability to pay school fees, other demands on children’s time and labor, and gender. The oldest stockist surveyed was 75, and the average age of stockists surveyed is 41. Thirty years ago, when the “average” stockist would have been 11, the opportunities for attending secondary school were distinctly lower than they are today. (That said, there is no correlation between stockist age and education level.) Older stockists would have had even fewer opportunities for schooling. Thus, a low level of formal education for a child born in Uganda between the 1930s and the 1970’s, or even today, does not have the same connotations - or impacts on business fortunes – that education level often does for people in developed western economies.

Hypothesis 4C: Women stockists will employ fewer assistants

Results. *n too small for testing.*

- Women stockists appear to have more assistants and more paid employees than male stockists. (*not statistically significant: n too small for testing*)
- Male stockists appear to have more family assistance than women stockists. (*not statistically significant: n too small for testing*)

Data and Discussion. Of the 64 stockists surveyed who were shop owners, 47 were men and 17 were women. While the small number of women stockist shop owners precludes tests for statistical significance, the hypothesis does not appear to be supported. Women stockists had an average of 2.00 assistants (range of 1-4) while male stockists had an average of 1.79 employees (range of 0-6). Female stockists surveyed appeared to have more paid labor assistance while male stockists appeared to have more family assistance. Only one man out of 47 surveyed paid a woman to work in his shop.

Paid Assistants. A higher percentage of women stockists hired non-family members to assist them. Forty-seven percent of the women stockists surveyed paid for assistance from outside their family while just 21% of men did. When all stockists and all full and part time labor are taken together, women stockists had a mean of .7 paid employees while male stockists had a mean of .3 paid employees. When considering only those stockists who did pay assistants, women and men stockists who did hire people appear to have paid about the same number of people (with a mean of 1.5 and 1.4 assistants respectively).

Women stockists appear to have more women working for them, both in full and part time capacities, than do stockists who are men. Four women stockists (24%) employed at least one women full time (and one of these employed 3 full time women). In contrast, just one male stockist of the 47 men surveyed (2%) employed a women full time.

Few stockists employed part time assistants. Only 2 male stockists and one female stockist employed a part time man, and one female stockist employed a part time woman. None of the 47 male stockists reported hiring a woman to work part time.

Family Labor. Men appeared to have more family members working for them. Male stockists had an average of 1.6 family members working for them while the corresponding figure for women stockists was 1.2 family

members. Most stockists relied on at least some family labor: 85% of male stockists and 77% of female stockists had family members working with them.

Eighty-one percent of male stockists had at least one male family member working for them at either full or part time, and 39% of male stockists had at least one female family member working for them. For women stockists, the gender mix was approximately reversed: just 35% of women stockists had a male family member working for them, while 71% had a female family member working as an assistant.

Gender Balance. It appears that men and women stockists each tend to have more assistants of their own gender than of the opposite. In other words, women stockists tended to have more women working for them and male stockists appeared to have more men working for them. Including all types of employees (paid non-family members and paid or unpaid family members), women stockists had an average of 1.47 female assistants and .65 male assistants while male stockists had .51 female assistants and 1.38 male assistants.

Hypothesis 4D: Women stockists will have lower profits

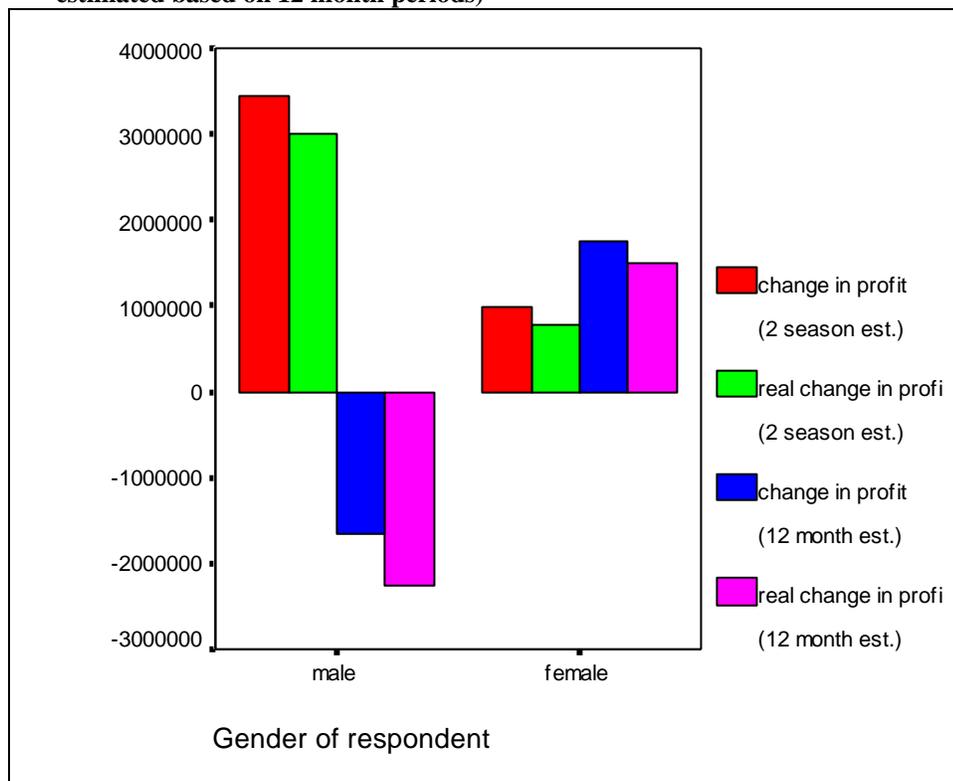
Results. *n* too small for testing.

- It does not *appear* that women stockists have lower profits than men. (*The data are inconclusive. Results depend on the nature of the time period for which stockists estimated their costs and sales, and the n is too small for testing.*)

Data and Discussion. According to stockists' estimates of their profits over the last 2 agricultural seasons, women's mean business profits appear to be *lower* than men's (about 1/3 of men's profits). However, according to stockists' estimates of their profits over the last 12 months, women's profits appear to be *greater* than men's (about 50% higher).³¹ Likewise, men appeared to have a much larger percent change in their profits between 2003 and 2006 when measured in terms of the last two agricultural seasons. When estimating their profits over the last 12 months and the corresponding months in 2003, women cited a much higher increase. (See Figure 2 below.)

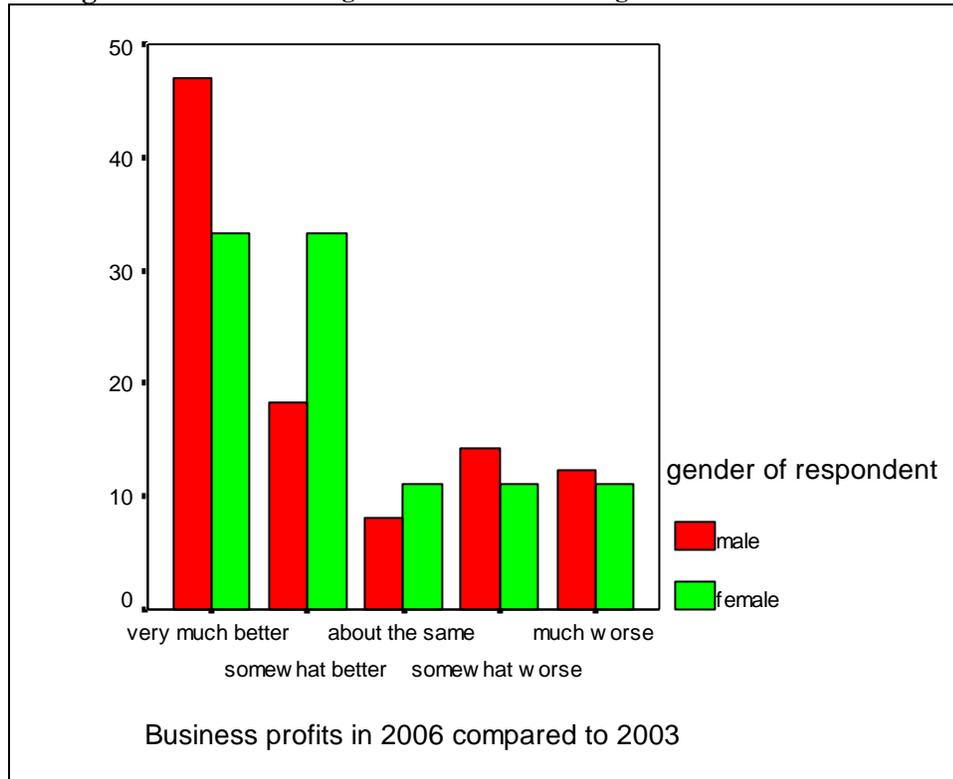
³¹ It is not clear why the results for these two time periods are so different. They may capture some different types of expenditures.

Figure 2: Gender of Stockist and Mean Estimated Change in Profit between 2003 and 2006 (includes inflation-adjusted profits and profits estimated based on 2 agricultural seasons and profits estimated based on 12 month periods)



When those who were in business in 2003 were asked to how they thought their profits this year compared with their profits in 2003, 69% of women stockists said that their profits were somewhat better or much better while 60% of men cited somewhat better or much better profits. About the same percent of men and women said that their profits were somewhat or much better in 2006 than 2005. (See Figure 3 below.)

Figure 3: Stockists' Categorization of their Change in Business Profits between 2003 and 2006



When asked about the number of customers they had in 2003 and 2006, women cited a 25% greater increase in customers than men did.

There appear to be relatively more men running large shops and relatively more women running smaller shops. There was a greater percentage of women in the lowest quartile of incomes from agricultural inputs sales in the most recent season, and there was a higher percentage of men in the highest quartile of incomes. However, for those stockists in the central range of income from agricultural input sales (above the 25th percentile and below the 75th percentile), men's and women's incomes appeared to be approximately equivalent.

Hypothesis 5: Size of business at project outset and location will affect impact of credit and training on retailers.

Hypothesis 5A: Stockists with larger initial sales volumes will improve sales more than stockists with smaller initial sales volumes

Results. *n is too small for testing.*

- Stockists who had larger initial sales income in 2003 *appear* to have *smaller* increases in sales between 2003 and 2006 than do stockists who had larger initial sales volumes. (*not statistically significant: n too small for testing*)

Data and Discussion. Most measures of sales showed no significant correlation with the magnitude of the change in sales between 2003 and 2005. However, 2003 sales volume and change in sales were statistically

significantly *negatively* correlated for one of the measures of sales: inflation adjusted estimated sales from November 2002 to October 2003 (Pearson's correlation coefficient of $-.323$, significant at $.02$ [the 95% confidence level]).^{32, 33} This relationship was not significant without the inflation adjustment.

Another way to look at the relationship between initial sales volume and change in sales over time is to calculate the percent change in sales. In other words, if a shop with a 2003 income from sales of 10,000 shillings who earned an additional 1000 shillings in 2006 would have a 10% increase, while a stockist who earned 200,000 shillings in 2003 with an additional 1,000 in 2006 would show a 1% increase. However, there were no statistically significant correlations of 2003 sales and percent change in sales either.

The negative slope of the one correlation that was found may be an indication of a difficulty in achieving large sales increases in situations where poverty levels are so high and where the 58% of farmers say they cannot increase their use of inputs because they do not have cash available when the inputs are needed and 47% can not increase their use of inputs because they simply do not have the needed cash – ever. (See Hypothesis 6Di below.)

Hypothesis 5B: Stockists with larger initial sales volumes will have greater access to credit

Results. Inconclusive.

- For just those stockists who received credit, the higher a stockists' 2003 sales volume, the higher the amount of credit that they used. (statistically significant: correlation)
- When all stockists were considered, there was no significant correlation between sales volume and amount of credit used. (not statistically significant: correlation)

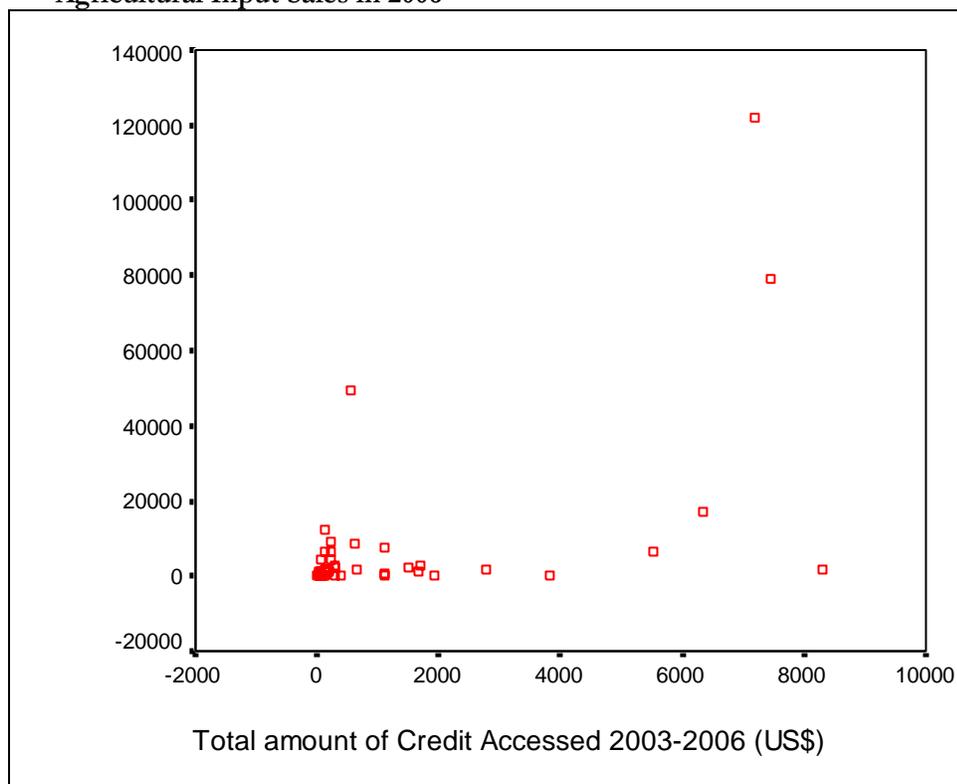
Data and Discussion. For those stockists who did access credit, there is a significant positive correlation between their estimated 2003 overall sales volume and the amount of credit that they accessed between 2003 and 2006 (Kendall's tau_b statistic of $.303^*$, significance level of $.013$). However, when examining only the agricultural inputs sales that the stockists calculated that they had during the second season of 2003, there is no correlation. There is no correlation between the initial sales volume and the amount of credit accessed when stockists who did not use credit in the last three years are included in the calculations.

In any case, even where a correlation was found, the linkage between initial sale volume and credit access is not completely obvious. Below is a scatterplot that shows the relationship between the amount of credit each of these stockists accessed over the past three years and the stockist's income from sales of agricultural inputs in 2006.

³² Only the Pearson correlation coefficient was found to be significant, and the Kendall tau_b and Spearman's rho coefficients (which are more appropriate for populations that may not have a normal distribution of the factor of interest – as is the case here) were not significant.

³³ These calculations include all stockists who were in business in 2003 (the top 3 outliers removed). N=51.

Figure 4: Relationship between the Amount of Credit Accessed between 2003 and 2006 and Agricultural Input Sales in 2006



Hypothesis 5C: Stockists located close to wholesalers and/or large suppliers will have greater increases in sales and profits

Results. *n too small for testing.*

Data. There were not enough stockists located close to wholesalers and large distributors in Mbale and Masindi to determine statistically significant differences. However, there appear to be some interesting differences in the data.

Estimated Overall Sales, Costs and Profits

- Stockists whose shops were directly in the capital towns of the districts of Mbale and Masindi *appeared* to have higher estimated increases in *overall yearly* sales, costs and profits between 2003 and 2006 than stockists whose shops were in outlying towns, trading centers or village. *(not statistically significant: n too small for testing)*

*Calculated Sales and Costs*³⁴

- Stockists who lived *outside* the towns of Mbale and Masindi *appeared* to have increased their spending on agricultural input inventories by about two times more than the stockists in the large towns who lived close to the wholesalers and distributors. *(not statistically significant: n too small for testing)*

³⁴ Note that because sales were for one agricultural season and costs for building inventories were spread over two seasons, profits could not be effectively calculated.

Stockists were asked about their sales and expenses in two ways. First, they were asked to *estimate* their *overall* sales and costs over the previous *two agricultural seasons*. Profit was calculated ex post based on these. Stockists were also asked about the specific agricultural inputs that they sold and asked to *calculate* how much they earned on sales of each specific input during the *present agricultural season*. Second, they were asked how much they spent over the *past two seasons* on purchasing their inventories of those specific inputs for their shops. The calculated sales and costs may be assumed to be a more accurate reflection of their agricultural inputs business than their estimated overall sales and costs.

While stockists in the central towns of Mbale and Masindi did appear to have higher sales, costs and profits by most measures, there was one notable exception: those in outlying towns appear to have had a much higher increase in the amount that they calculated that they spent on their inventories of the agricultural inputs that they purchased for their shop.

The estimated change in sales over two seasons for stockists in the capital towns was 30% higher than the overall sales estimates for the stockists in the outlying areas. The difference in their calculated sales of specifically agricultural inputs had roughly the same relationship, with the current season sales calculations of the stockists in the capital towns being 27% higher than the sales calculated by stockists in the outlying areas.

However, when the stockists calculated the amount that they *spent* on their inventory of specifically agricultural inputs, the relationship between those in the capital towns and those elsewhere looks quite different. Stockists in the capital towns calculated that the increase in their agricultural input costs was 48% *less* than the change calculated by outlying stockists. In other words, outlying stockists *earned about one quarter less* on agricultural input sales than their counterparts in the central towns. However, *they spent about 50% more* to purchase the inputs they sold.

Because sales data are only for the second agricultural season and the inventory costs are for both seasons (most input purchases tend to be made in bulk and tend to be made more in the first season than the second) it is not possible to directly calculate profits on agricultural inputs. However, we can look at the change in 2-season costs: change in 2nd season sales ratios for the two groups. By comparing these two measures we find that stockists in the central towns had a 2nd season expenditure to 2nd season sales ratio of 1.14 to 1. The same ratio for outlying stockists was 2.79 to 1.

Discussion. This merits attention because it could have serious implications for stockists who are in rural areas. There may be a variety of possible explanations for this difference. It may be that the cost of transporting inputs is higher for the outlying stockists. It may be that more centrally located stockists were closer to large wholesalers or distributors and could thus buy additional inventory as needed so that inventories and sales were more closely matched. It could be that there is a time lag for outlying stockists, and that they did not begin to increase their purchases until after the more centrally located stockists did (though each group had an average number of years in business of about 5.5). However, we do not have the data at this time to determine what the explanation might be.

3. FARMERS

Farmer Input Use. Almost all farmers purchased at least some seeds, but very few purchased any of the other inputs examined here: only 22 of the 349 surveyed farmers purchased agrochemical inputs in 2003. Given this small number, it is not possible to test for statistical significance based on this type of input alone. Therefore, to look at the change in input purchases, three categories of inputs were examined: 1) Seeds; 2) Agrochemicals [fertilizers, pesticides and herbicides]; and 3) Seeds and agrochemicals together. Fertilizers, pesticides/fungicides (these were combined in one question), and herbicides were combined together under the category of “agrochemicals” because so few people purchased each individual item.

Use of agrochemicals, while quite limited, appears to be growing. In 2003, just 14% of the sample (22 farmers) bought any of these: 8% purchased fertilizer, 9% purchased a pesticide or fungicide, and just 1 farmer purchased an herbicide. No farmer purchased all three. In 2006, 49 surveyed farmers (31%) bought some type of agrochemical. Twenty-six percent of farmers bought pesticides or fungicides, 18% bought fertilizer, only 3% of farmers purchased an herbicide, and just 2 people (1.3%) bought all three.³⁵ Farmers did mention other agricultural input expenses, such as purchase of small tools and rental of oxen for plowing, but these were typically not accessed through a stockist, so they are not included in the analysis here.

Table 26: Agricultural Inputs Used by Farmers

Agricultural Inputs Used	% of Farmers Using in 2003	% of All Farmers Using in 2006	% Farmers who do Not Shop with AT Uganda-trained stockists using in 2006	% Farmers who Shop with AT Uganda-trained Stockists using in 2006
Seeds	91%	99%	99%	100%
Fertilizers	8%	18%	9%	31%
Pesticides	9%	26%	11%	40%
Herbicides	0.7%	3%	0%	8%
Equipment and tools	54%	56%	57%	56%
Animal feed	16%	8%	7%	10%
Animal Drugs	33%	42%	37%	52%

- *No statistically significant differences between participating and non-participating farmers were found for seeds or equipment and tools.*
- *The number of farmers who purchased agrochemicals and animal-related inputs was too small to allow for statistical significance to be determined.*

Virtually all farmers purchased at least some inputs 2006. Some purchased ordinary seed to supplement what they had saved from the last harvest. Others purchased seed to use because effectively storing viable seed for some crops is not practical for individual farmers to do. In addition, many of them purchased improved seeds. Therefore, the likelihood of purchasing inputs is examined here from a variety of angles.

Notes on the approach to the analysis. The project supported stockists to encourage farmers to invest in and appropriately use improved seed (seed for specialized varieties of high yield crop varieties or varieties thought to be more attractive to consumers) and agrochemicals (fertilizers, pesticides and fungicides, and herbicides) to improve their yield. In their responses, farmers were not consistent about disaggregating how much they spent on improved and ordinary seeds, so seed purchases here are not an effective measure of whether or not a farmer is changing his or her agricultural practices. While some farmers also purchased tools and equipment, small farmers in Uganda tend to own very few tools, and tool purchases are both infrequent and relatively very expensive for them. Because of this, farmers who happened to purchase tools during the period covered by the survey may artificially appear to have higher general expenses than their counterparts who did not happen to purchase tools during this time. Likewise, very few farmers reported equipment rental, and it was a relatively large expense for those who did.

Therefore, this analysis focuses on agrochemical purchases. Because so few of the farmers in the sample purchased fertilizers (13 farmers purchased fertilizers in 2003 and 25 purchased them in 2006), pesticides/fungicides (13 farmers in 2003 and 40 in 2006), or herbicides (1 in 2003 and 4 in 2006), it was not

³⁵ Note that because these low numbers of agrochemical purchasers, it was not possible to conduct statistical analysis on these inputs.

possible to run a statistical analysis on the individual types of agrochemicals. Therefore they were aggregated together for analysis. In looking at how likely farmers are to purchase inputs, we look here at

- 1) whether or not they buy agrochemicals
- 2) how much they spent on the basic agricultural inputs of seeds and agrochemicals
- 3) how much they spent on agrochemicals
- 4) how many types of inputs they purchased (this includes the number of varieties of seeds and the number of classes of agrochemicals)
- 5) how many classes of agrochemicals they purchased

To shed light on changes in farmer purchases, both the change in both the amount of money spent on input purchases between 2003 and 2006 and the change in the number of inputs purchased were examined. A large farmer making even an incremental increase can end up spending quite a lot of money on that change. A farmer with very low cash resources who is just beginning to purchase inputs improved inputs will spend less money in total, but it may represent a greater shift in both in terms of household spending decisions and in terms of incremental impact on production. At the same time, a large farmer who makes a high volume of input purchases and who slightly decreases her or her spending could be dealing with an amount of money that would obscure the small increases in spending that smaller farmers may have to struggle to find the cash to make. Looking at percentage changes in spending helps to cast light on the changes made by farmers who spend relatively little on inputs to begin with. Therefore, the *relative* change (that is, the percent change)³⁶ in spending needs to be examined as well as the total change in the amount spent.

For purchases of 1) agricultural chemicals together [fertilizers, pesticides/fungicides, and herbicides]; 2) seeds; and 3) both seeds and agricultural chemicals together, the following aspects of change in purchasing were explored:

- difference in the number of types of that input that were purchased in 2003 and 2006
- difference in the amount spent on that input in 2003 and 2006
- percentage change in the amount spent on that input between 2003 and 2006

To examine the link between the demographic factors of interest here and the types of expenses mentioned above, both bivariate correlations and t-tests for independent means were run. The top 4 outliers for amount spent on agricultural inputs, the top outlier for number of types of agrochemicals purchased, and the top two outliers for product sales were not included in the analyses reported below.

Hypothesis 6: As a result of the project, farmers will purchase increased amounts of inputs, find new market outlets and experience greater volume of production, sales and profits

The project supported the stockists to learn how to teach farmers about the production benefits of improved seeds and of appropriate use of agrochemicals. Among the methods that they used were giving advice to farmers visiting their shops, demonstration plots (see Section I.2.b) and advertising. A combination of teaching farmers to use inputs and advertising their availability at the shops of participating stockists was done through flyers and brochures, signs, training, and as part of advice given to farmers while in the stockists' shop. The project also supported radio spots and newspaper advertisements. In addition, stockists were trained to help farmers get more income from the sale of their agricultural produce (and thus have more cash available to buy inputs that would be expected to improve future harvests), by providing information on market prices and on where to market products.

³⁶ The relative or percentage change in spending is calculated as follows: [(the amount spent on inputs in 2006 minus the amount spent in inputs in 2003)/ by the amount spent in 2003].

Hypothesis 6A: Improved stockist marketing will result in increased farmer purchases of inputs

Results. Hypothesis Supported.

- Most farmers who saw or heard advertising about inputs said that the advertising influenced their input purchase decisions. (See Hypothesis 6Ciii below)

Data. All told, 91 farmers reported that they had seen or heard some type of advertising that promoted agricultural inputs. Seventy-five percent of those who said they heard radio advertisements said that the radio ads influenced them. Twenty-four of the 27 people who saw a sign in a shop said that it had had an influence on their purchases. (See Table 27.)

Table 27: Input Advertising and its Influence on Farmer Purchasing Decisions

	Farmers Who Report Seeing or Hearing this type of Advertising			
	# of Farmers	% of Farmers	Farmers who say that their Input Purchases were Influenced by the Advertising	
			# of Farmers	% of Farmers who say they were exposed to this
Radio	86	66%	57	75%
Sign in a Shop	27	21%	24	89%
Sign by the Road	11	9%	9	81%
Leaflet, Flyer or Brochure	3	2%	3	100%
Newspaper	2	2%	2	100%

Twenty people said that they did not purchase seeds in 2003, but did in 2006. Six of them visited a demonstration plot. Ten of them heard advertisements on the radio. To provide an overview of the impact of stockist marketing strategies, Table 28 below summarizes the aspects of farmer marketing that are further explored in hypothesis 6C. In sum, it appears that radio advertising was good for getting farmers to try new seeds, while demonstration plots were good for getting them to spend more on seeds. (See Section 6C for details.)

Table 28: Impacts of Stockist Marketing Strategies on Farmer Purchases (for those who did purchase inputs in 2003)

	# Farmers who bought (2003)	Mean Amount Spent (US\$)	Change in # of Types Bought		% Change in # of Types Bought		Change in Amount Spent (US\$)		% Change in Amount Spent	
		2006	Mean	Median	Mean	Median	Mean	Median	Mean	Median
1. All Farmers										
Agricultural Chemicals	20	\$52.26	0.29	0	33%	0%	\$14.37	\$2.40	243%	33%
Seeds	131	\$37.71	0.84	0	48%	0%	\$10.84	\$3.96	163%	42%
Seeds & Agricultural Chemicals	131	\$52.78	0.78	0	61%	25%	\$12.87	\$4.92	213%	41%
2. Farmers who Received Information on Where to Market Products										
The number of farmers who said that they received marketing information was too small – and the range of costs was too broad - to lend itself to meaningful analysis. Removing any one farmer from the analysis had a large impact on the results.										
3. Farmers who have Seen a Demonstration Plot										
Agricultural Chemicals	9	\$60.42	0.33	0	48%	0%	\$16.51	\$7.02	479%	71%
Seeds	25	\$47.13	0.50	0.5	41%	0%	\$7.49	\$5.23	54%	34%
Seeds & Agricultural Chemicals	25	\$106.48	0.59	0	44%	25%	\$14.44	\$10.91	138%	35%
4. Farmers who were Exposed to Media Advertising (Radio and/or Newspaper)										
Agricultural Chemicals	12	51.22	0.11	0	28%	0%	14.24	2.40	144%	25%
Seeds	76	51.22*	1.05*	1	61%*	31%	10.45	5.04	164%	38%
Seeds & Agricultural Chemicals	78	60.99**	0.99	1	77%	35%	12.37	6.80	226%	40%

† 2003 costs have been adjusted for inflation

- Independent samples T-test: * indicates a significant difference at the 0.05 level.
** indicates a significant difference at the 0.01 level.
- The number of farmers who purchased agrochemicals was too small to allow for statistical significance to be determined.

Discussion. When farmers were asked why they increased their input use, the most common response was that they “wanted to increase production,” followed by “increased knowledge about inputs purchased.” Both of these could be related to the types of information and education that the project supported stockists to provide.

Hypothesis 6B: Farmers who purchase from program stockists will make more from sales of their products

Results. Hypothesis Supported.

- Farmers who shop with a stockist trained by AT Uganda have higher income from sales of their products than farmers who do not. (*significant difference: test of independent means*)
- Farmers who shop with an AT Uganda-trained stockist have higher agricultural input costs. (*significant difference: test of independent means*)

Farmers who shopped with AT Uganda-trained stockists had both higher incomes from product sales and higher input costs. It is not clear, however, whether these farmers had higher profits. Costs of farming include such elements as land, labor, cost of purchasing food not grown by the household, forgone income, etc., many of which are not easy to monetize accurately. Because of this, full costs can not be meaningfully calculated here.

Data. There is a statistically significant difference between the income from crops sales by farmers who shop with AT Uganda-trained stockists (mean of US\$749) and farmers who do not (mean of US\$455: significant at a 95% confidence level). (See Table 29 below.) Farmers who shop with an AT Uganda-trained stockist have a greater net difference between their income from sales of crops and costs of seeds and agricultural chemicals (not counting other types of expenses such as tools, labor, rent, etc.), though that difference is no longer significant when the cost of tools is added in.

Farmers who shopped with participating stockists spent significantly more on seeds and agrochemicals in 2006 (US\$73 vs. US\$34.69). However, they already had significantly higher expenditures on these items in 2003 (US\$37 vs. US\$18). When those two years are compared, the change in expenses and the relative or percent change in expenses were not significant. This leaves open the question of why their expenditures were already different.

Table 29: Differences in Sales and Purchases of Farmers who Shop with Stockists who Participated in the AT Uganda Project and Those who Did Not

<i>All figures are in \$US</i>	Shop with AT Uganda stockists	Shop Elsewhere	Statistical Significance
Income from Crop Sales (2006)	\$748.70	\$454.86	.019*
Amount Spent on Seeds and Agrochemical Inputs (2006)	\$73.00	\$34.69	.000**
Amount Spent on Seeds and Agrochemical Inputs (2003)	\$37.44	\$18.27	.025*
Change in Amount Spent on Seeds and Agrochemical Inputs (2003 to 2006)	\$13.43	\$7.24	.312
% change in Amount Spent on Seeds and Agrochemical Inputs	0.89%	0.85%	.965
Difference between Sales and Seeds/Agrochemical Input Costs	\$676.92	\$420.17	.038*
Amount Spent on Seeds, Agrochemicals and Tools	\$158.20	\$72.61	.000**
Difference between Sales and Seed/Agrochemical/Tools Input Costs	\$594.54	\$382.25	.079

- *Independent samples T-test: ** indicates a significant difference at the 0.01 level.*

- *Note that the calculations of difference between sales and input costs do not include labor, rent and other costs.*

It is worth noting that the means by which farmers choose stockists is complex. While many farmers do not shop with a stockist at all, for those who do, there are a variety of factors that influence which stockists they choose. This research did not explore the gamut of these factors, which are expected to such considerations as family ties along with proximity, quality of products, etc. However, it was clear in this research that proximity is not an overriding factor.

Therefore, the types of impacts that stockists trained in BDS have on farmer input purchases were further explored by examining the differences between farmers who live near trained stockists and farmers who do not. As described above (see Section V.2.C.1 and Table 9 for a breakdown of characteristics of experimental and control farmers), farmers fell into four types of categories vis a vis the stockists of interest to this research:

- 1) Experimental Group Farmers
 - a. live in a village or town near where a stockist who has participated in the AT Uganda program is located and shop with that participating stockist OR (in Figures 5 and 6 below, this farmer is classified as “Full Experimental”)
 - b. live in a village or town near where a non-participating (control) stockist is located and do not shop with that stockist but do travel to shop with a participating stockist (in Figures 5 and 6, these are labeled “experimental village/control stockist” or “Exp’l Vill/Ctrl Shop”)
- 2) Control Group Farmers
 - a. live in a village or town near where a participating stockist is located and do not shop with that participating stockist but shop with a non-participating stockist or buy inputs from market vendors, neighbors, or other sources (labeled as “control village/experimental stockist” or “Ctrl Vill/Exp’l Shop”)
 - b. live in a village or town near where a control stockist is located and shop with that control stockist or make purchases from other sources (labeled as “Full Control”)

The farmers who lived in the same parish as a stockist who did not receive BDS training from the project and went out of their way to purposefully shop with a stockist who did participate in the AT Uganda project had the highest sales and the highest input expenses. In particular, their sales were significantly higher than the sales of farmers who lived near a participating stockist but did not shop with him or her. Their sales were also significantly higher than the sales of farmers who lived in the same parish as a control stockist and shopped with that nearby stockist or did not make purchases from a stockist at all. (ANOVA Tamhane’s T2 with the former significant at the 95% level and the latter at the 99% level). See Figures 5 and 6 below for the information on mean input purchases and crop sales for farmers in the four categories described above.

Figure 5: Farmer Choice of Stockists and Mean Amount Spent on Agricultural Inputs

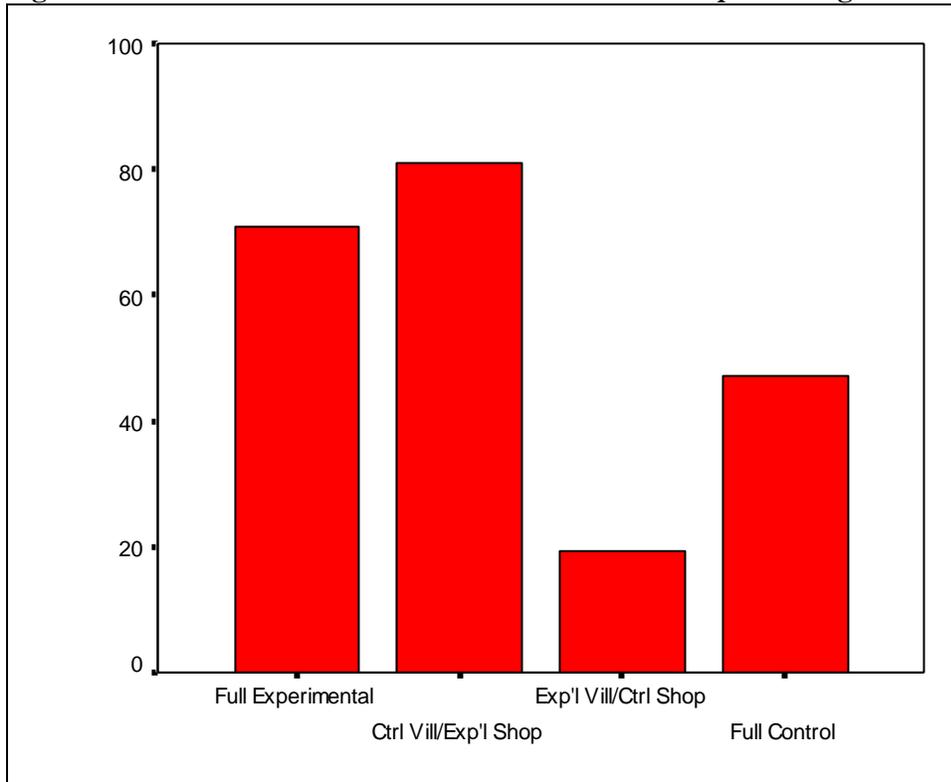
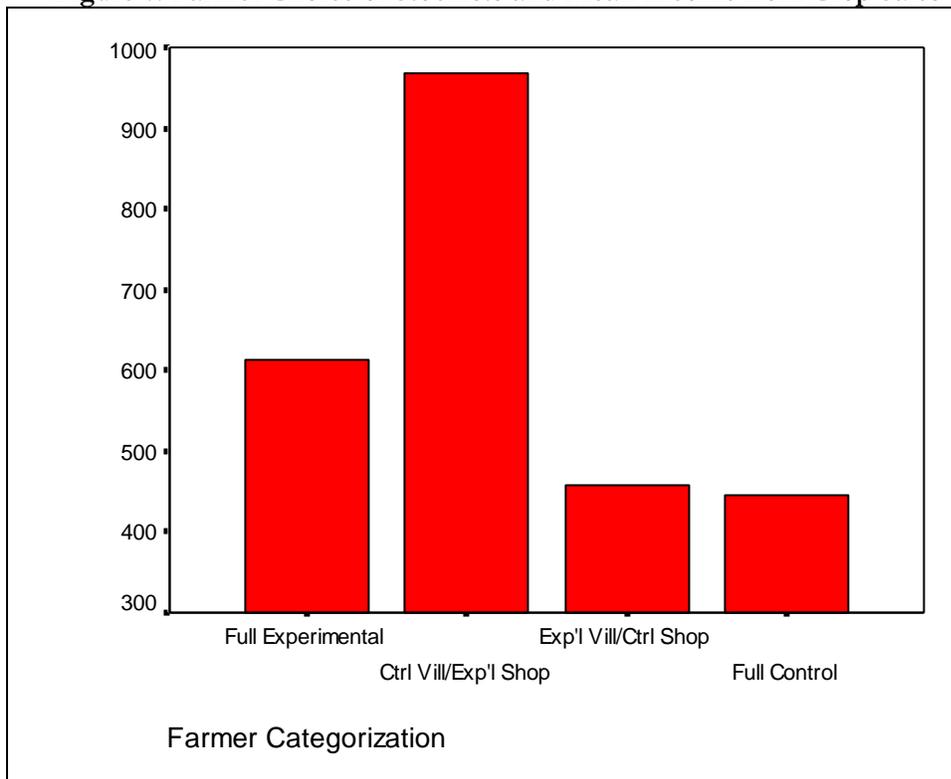


Figure 6: Farmer Choice of Stockists and Mean Income from Crop Sales



Discussion. Farmers who did not shop with participating stockists appeared to spend less on inputs. (See Figures 5 and 6 above). Again, it is not possible to show causality with a correlation, so it is not possible to say with certainty that the farmers had higher sales *because* they shopped with participating stockists.

Of particular interest are the farmers who did not shop with the stockist nearest them. The farmers who went out of their way to shop with stockists who were trained by AT Uganda may provide an indicator of the effectiveness of the training. These appear to be farmers who are doing well – at least well enough to choose where they shop and travel there. They spent an average of US\$81 on seed and agrochemical purchases.

At the other end of the spectrum are the farmers who live near a participating stockist but do not shop with him or her. These farmers have low income from sales and spend very little (an average of US\$19 and a median of US\$13) on inputs. These farmers may simply not have enough cash available to purchase significant inputs.

The most common reason that farmers gave for switching stockists was that they were not satisfied with the quality of the products at the original shop.

Hypothesis 6C: Farmers who already purchase inputs will increase amount of inputs used if they are given marketing information, visit a demonstration plot, or have been exposed to media advertising

See Hypothesis 6A and Table 28 above for an overview of stockist marketing. Because family finances are a primary factor affecting the amount of inputs purchased, and because, at the start of this research, most farmers did not purchase any of the specialized seeds, fertilizers, pesticides or other inputs that the project was assisting stockists to promote, for this set of hypotheses the analysis is centered on analyzing changes in purchasing patterns of people who already purchased inputs in 2003.

Hypothesis 6Ci: Farmers who already purchase inputs will increase the amount of inputs used if they are given marketing information

Results. *n* too small for testing.

- Farmers who report receiving information on marketing locations and prices do not *appear* to have increased the amount they spend on inputs. (*not statistically significant: n* too small for testing)

Data. Eighteen farmers reported receiving information on places to market products and/or on market prices. Of the 12 farmers total who reported receiving information on places to sell products, three reported receiving this information every day, one said that she received it two times per week, and three others said that they received it weekly. Five additional farmers reported that they received information on market prices weekly, and two reported receiving it one or two times. Because so few farmers reported receiving information on where to sell their products, it was not possible to carry out statistical analysis. Figure Set 7-10 below provides information on the seed and agrochemical input use by these farmers.

Farmers who reported receiving information on where to market their products and/or market prices appear to have larger businesses (spending much more on inputs and making more on sales) than those who did not. These farmers spent, on average, three times more on agricultural inputs than did the farmers who did not report receiving marketing information (this increased to six times as much when the top 3 outliers – farmers who reported daily or weekly receipt of marketing information – were included).

Note that the number of farmers in this sample is so small and the amounts spent are so varied that it is not possible to draw conclusions. For instance, one large farmer increased his seeds purchases and drastically

reduced his agrochemical purchases. The impact of this person's shift reduction in agrochemical purchases was enough to make the mean change for the entire group to become negative. Still, the data are of interest.

The four box plots below show the distribution of the data. Only farmers who already purchased seeds and or agrochemicals in 2003 are included here, and outliers were *not* removed for this illustration. All amounts have been converted to US dollars, and 2003 expenses have been adjusted for inflation to make them more comparable to purchases at 2006 prices. The boxplots compare four aspects of input purchases of farmers who *did* and who *did not* receive information on places to market farm products or market prices: Figure 7) change in the amount spent on seeds between 2003 and 2006; Figure 8) % change in the amount spent on seeds between 2003 and 2006; Figure 9) change in the amount spent on agrochemicals between 2003 and 2006; and Figure 20) percent change in the amount spent on agrochemicals between 2003 and 2006.

Figure Set 7-10: Spending on Input Purchases by Farmers Who Did and Did Not Receive Marketing Information

Figure 7: Marketing Information & Change in real Amount Spent on Seeds

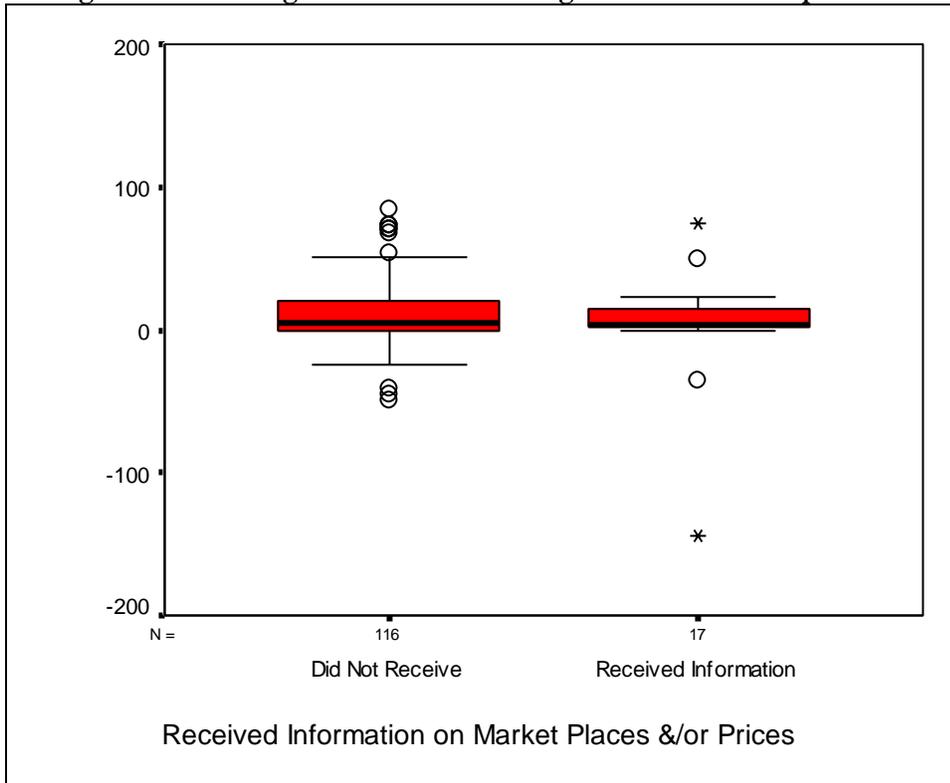


Figure 8: Marketing Information & % Change in real Amount Spent on Seeds

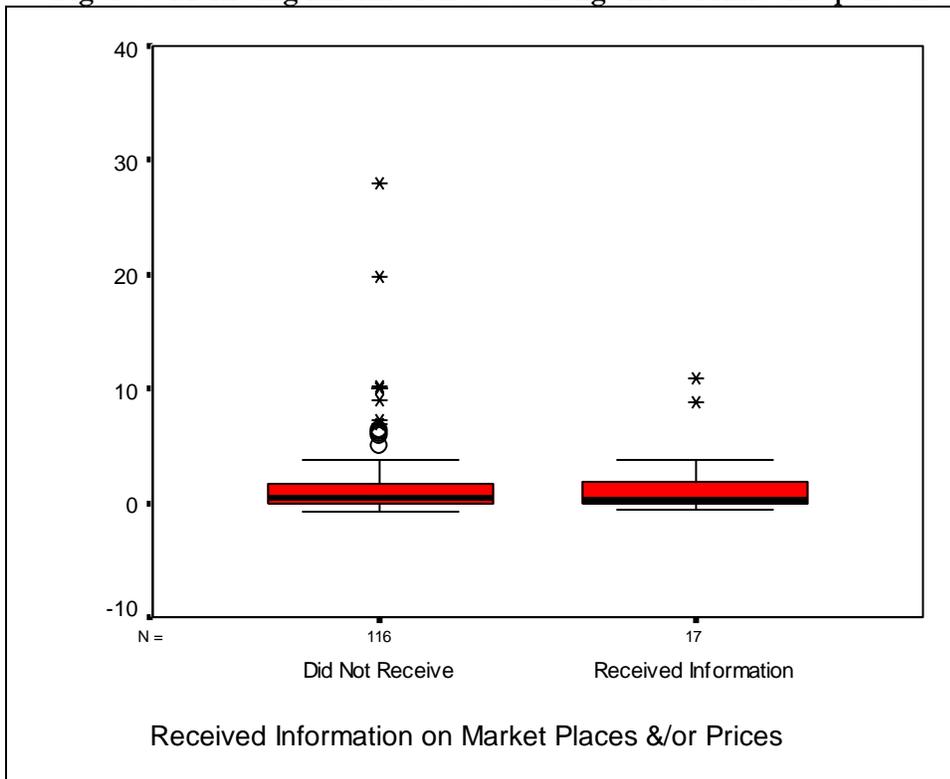


Figure 9: Marketing Information & Change in real Amount Spent on Agrochemicals

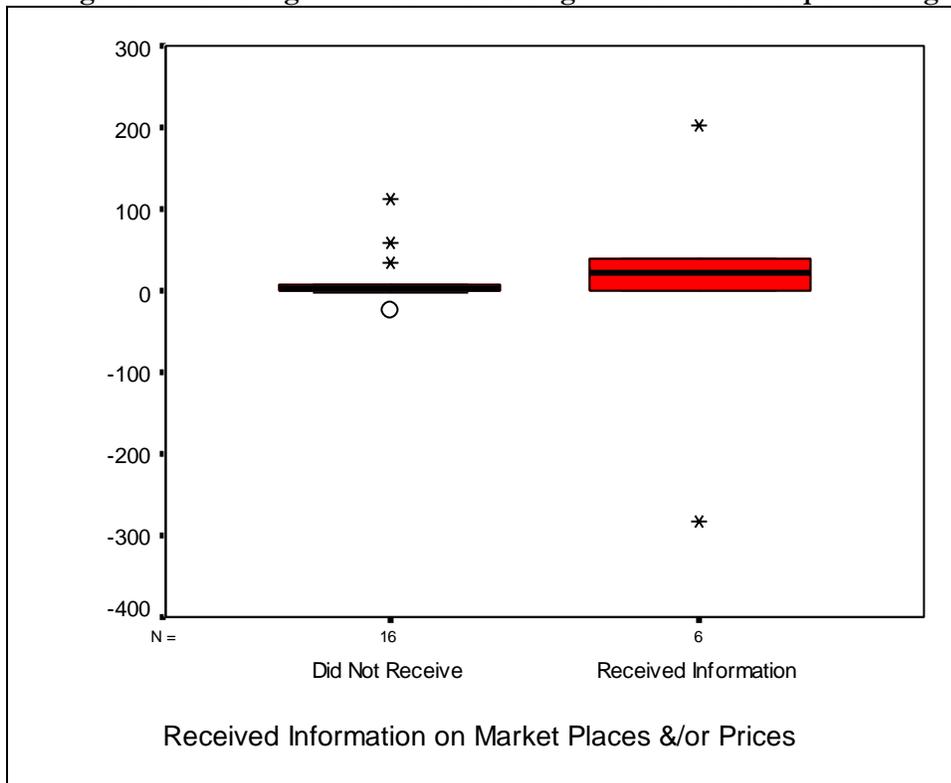
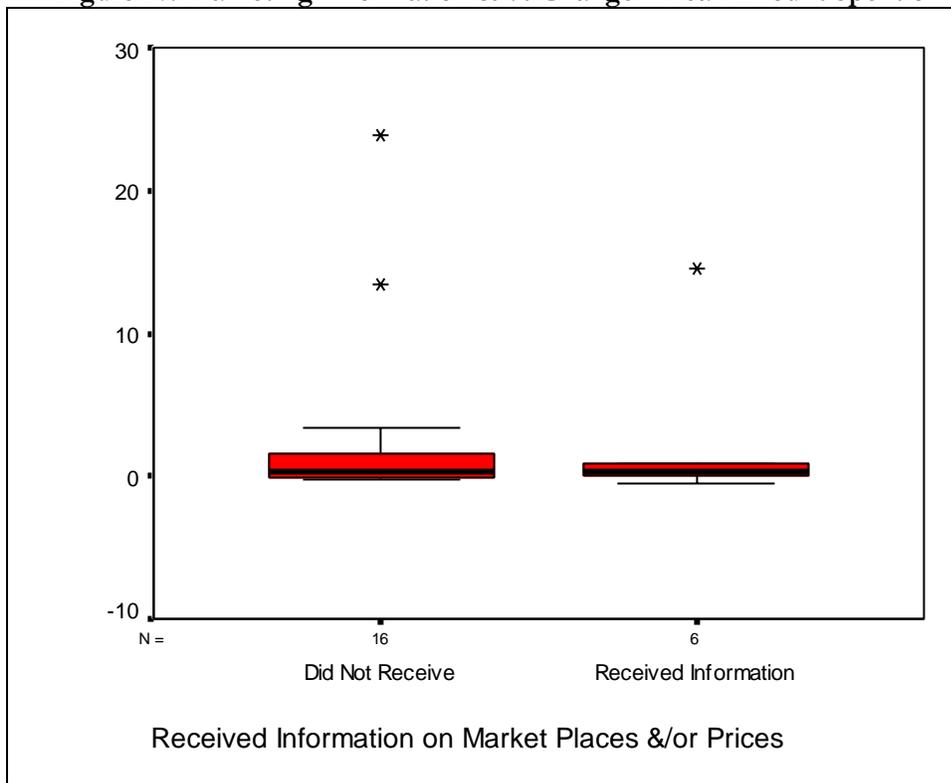


Figure 10: Marketing Information & % Change in real Amount Spent on Agrochemicals



Those who did receive marketing information appear to be among the farmers with the highest input use (in particular they had high expenditures on agrochemicals) and the greatest amounts of products to sell. While the reason for this difference is not known, and while it is not clear which direction the causality of the apparent link might go, the fact that their 2003 expenditures were also proportionally higher than those of other farmers, makes it not impossible to suggest that their higher expenditures were not directly related to changes in the availability of marketing information supported by the AT Uganda project.

Discussion. Perhaps a central point of interest is why so few people with low overall input expenditures do *not* report receiving information to facilitate marketing. It may be that the people with high input use report receiving marketing information because they have a high interest in it. This may be, in turn, because they have high production (itself possibly based on a high use of inputs). It may also be due to the need to get higher prices for crops in order to pay for input use. It may be that their volume of production gives them the flexibility to choose when they prefer to sell their products and thus makes timely and frequent access to market information important. It may also be that they have the means available (e.g., access to a radio and electricity or a newspaper, proximity to others with access to the information, etc.) to reasonably and feasibly be able to monitor prices and outlets.

Conversely, those farmers who do not report receiving marketing information - much less frequent information - may not be able to take advantage of it and so may not find it relevant to seek out or pay attention to the information in their current conditions. They may have infrastructural constraints to receiving the information (as mentioned above). They may also simply not be seeking out or paying attention to the available marketing information because it may not be relevant. These may be farmers who may not sell very much of their agricultural produce at all. They may be farmers who lack transportation to markets, so the information on good prices at a faraway location is not useful. Due to lack of transportation, distance to markets, need for immediate cash, and other factors, many farmers are dependent on middlemen who buy at farmgate and have wider scope to dictate prices. Since many Ugandan farmers lack the means to effectively store their products, it may also be that they generally sell their products as they are harvested – at the same time that other farmers near them are selling their products. This situation tends to reduce and homogenize local prices.

Hypothesis 6Cii: *Farmers who already purchase inputs will increase amount of inputs used if they have seen a demonstration plot*

Results. *n too small for testing.*

- Farmers who have seen a demonstration plot *appear* have a greater relative increase in spending on agrochemicals. (*not statistically significant: n too small for testing*)
- Farmers who have not seen a demonstration plot *appear* to have a greater relative increase in spending on seeds. (*not statistically significant: n too small for testing*)

This suggests that visiting a demonstration plot may have an impact on how farmers choose to spend their input money.

Data. The point of interest here is whether and how farmers change their input purchases after having visited a demonstration plot designed by a stockist to show the effects of the use of different types of improved seeds, agrochemical inputs and other farming. Part of the stockist's goal in setting up a demonstration plot is to sell more inputs to farmers (as well as to help farmers to increase their own production and incomes). Setting up and maintaining a demonstration plot is a considerable amount of work. Therefore, it is important to examine potential influences on input spending patterns of farmers who were exposed to the agricultural practices the stockists employed in designing their demonstration plots.

Thirty-two of the 153 farmers surveyed (21%) had visited a demonstration plot. Of these, 72% (25 of the farmers who had seen the demonstration plot) had purchased seeds in 2003 and 18% (six farmers) had not. This leaves the numbers too small to run statistical test, but there appear to be some patterns in the data (See Table 30 below). In reading the table, note that, as is the case with much of the data, the range of responses is broad with the bulk of respondents having lower expenditures. Here, both actual spending increase and relative (percentage) increases are examined. Because of the great range in amounts of inputs purchased, and the very high expenditures by some farmers, the results skew high. Therefore, both the mean and the median are reported here to provide better context for interpreting the data.

Table 30: Changes in Input Purchases by Farmers who have Visited a Demonstration Plot³⁷

<i>Amounts are in \$US</i>	# Farmers who bought (2003)	Mean Amount Spent		Change in # of Types Bought		% Change in # of Types Bought		Change in Amount Spent		% Change in Amount Spent	
		2003†	2006	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Farmers who have Seen a Demonstration Plot											
Agricultural Chemicals	9	\$36.29	\$60.42	0.33	0	48%	0%	\$16.51	\$7.02	479%	71%
Seeds	25	\$36.29	\$47.13	0.50	0.5	41%	0%	\$7.49	\$5.23	54%	34%
Seeds & Agricultural Chemicals	25	\$72.58	\$106.48	0.59	0	44%	25%	\$14.44	\$10.91	138%	35%
Farmers who have Not seen a Demonstration Plot											
Agricultural Chemicals	13	\$69.19	\$58.28	0.38	0	0.20%	0%	\$-11.92	\$0.60	-26%	-1%
Seeds	88	\$20.34	\$33.52	0.83	0	0.49%	0%	\$12.00	\$3.96	198%	44%
Seeds & Agricultural Chemicals	93	\$89.53	\$74.08	0.84	0	0.68%	17%	\$10.45	\$4.40	228%	44%

- The number of farmers who visited a demonstration plot was too small to allow for statistical significance to be determined.
- † adjusted for inflation

The impact of the demonstration plots appears to be largely in increased farmers spending on agrochemicals. Of note here is that those who did see a demonstration plot *appear* to have increased their spending on agrochemicals much more than those who did not visit a demonstration plot. Farmers who visited a demonstration plot *increased* their average expenditure by 479% (median increase was 71%) while farmers who did not visit a demonstration plot *decreased* their spending on agrochemicals by an average of 26% (median decrease was 1%).

Farmers who had *not* seen the plots had a higher percent change in seed expenditures, around a four-fold relative increase. Still, farmers who visited a demonstration plot already spent more on seeds in 2003 and continued to spend more on seeds in 2006. There does not, however, appear to be a difference in the change in number of types of seeds that they purchased.

Discussion. Farmers who did not see a demonstration plot (most farmers) appear to have reduced their expenditure on agrochemicals by about the same amount that they increased their expenditure on seeds. It may be that this was simply a trade-off in the use of cash.

³⁷ Because some farmers had small amounts of land for cultivation and/or low levels of cash for input purchases while other farmers had more extensive farms and large input expenditures, the net change in number of types of inputs purchased as well as the amount spent on those purchases were examined. To further get at how purchasing was changing, we looked at the % change in number of types of inputs and in the amounts spent.

Overall, the amounts of money noted may appear to be quite small. However, they can be quite significant in terms of the cash that many Ugandans have available. (See Hypothesis 6Di for a discussion of farmer cash availability)

Hypothesis 6Ciii: Farmers who already purchase inputs will increase amount of inputs used if they have been exposed to media advertising

Results. Hypothesis Partially Supported.

- Farmers who heard radio advertisements had larger increases in the number of types of seeds that they purchased. (significant difference: test of independent means)
- There was no significant difference in the amount that they spent on seeds. (difference found was not significant: test of independent means)

Data. Because only 4 farmers reported having seen newspaper advertisements for agricultural inputs, and because all of them also reported having heard radio advertisements, this analysis is focused on the impact of the radio spots.

Farmers who bought seeds in 2003 and said that they heard advertisements for inputs on the radio bought an average of 1.05 more types of seeds and/or agrochemicals in 2006 than they did in 2003; this represents a difference of 59% more types of inputs than they had purchased earlier. Farmers who did *not* recall having heard radio advertisements bought an average of .38 more types of seeds and/or agrochemicals in 2006, for an average increase of 22%. The difference in the increases of these two groups was significant at the 99% confidence level. (See Table 31 below.)

Table 31: Changes in Input Purchases by Farmers who have been Exposed to Media Advertising

All amounts are in \$US	# Farmers who bought (2003)	Mean Input Costs 2006	Change in # of Types Bought		% Change in # of Types Bought		Change in Amount Spent†		% Change in Amount Spent	
			Mean	Median	Mean	Median	Mean	Median	Mean	Median
Farmers who Said they Have heard Radio Advertisements or Seen Newspaper Advertisements for Inputs										
Agricultural Chemicals	12	\$51.22	0.11	0	28%	0%	\$14.24	\$2.40	144%	25%
Seeds	76	\$51.22**	1.05*	1	59%*	31%	\$10.45	\$5.04	164%	38%
Seeds & Agricultural Chemicals	78	\$60.99**	0.99	1	77%	35%	\$12.37	\$6.80	226%	40%
Farmers who Said they have <i>Not</i> heard Radio Advertisements or Seen Newspaper Advertisements for Inputs										
Agricultural Chemicals	8	\$29.32	0.11	0	43%	0%	\$14.56	\$4.11	370%	38%
Seeds	53	\$30.57	0.38	0	22%	0%	\$11.40	\$3.90	161%	48%
Seeds & Agricultural Chemicals	53	\$35.72	0.41	0	28%	0%	\$13.60	\$3.96	194%	42%

• ANOVA: ** indicates a significant difference at the 0.01 level.

* indicates a significant difference at the 0.05 level.

† 2003 costs have been adjusted for inflation

Discussion. Exactly what may be attributable to radio advertising is not completely clear. Farmers who heard radio advertisements also spent significantly more on seeds in 2006 (US\$ 43.62) than farmers who were not tuned in (US\$ 27.96). However, they also spent significantly more on seeds in 2003: US\$ 33.07 for farmers who heard ads and US\$ 15.00 for those who did not. This suggests that differences in the overall amount money spent on seeds may have been linked to factors that correlated to radio access rather have resulted from it. That is, it may be that people who lived in contact with radios and radio advertising may have also face different farming circumstances or simply different life circumstances.

Interestingly, though, while the difference in the number of types of seeds that each groups purchased in 2003 was not significant, the difference in number of types in *was* significant in 2006 (99% confidence level). *This suggests that the influence of the radio may have been in encouraging them to try new varieties or to broaden their production.*

For the farmers with less than the mean income from crops, this pattern also held true. In 2006, farmers with lower income from crops who heard radio advertisements purchased significantly more seeds: they bought an average of 4.8 different types of seeds while those who said they had not heard radio advertisements bought an average of 3.9 different types of seeds. However, as above, this may be related to other causes than radio advertisements since the change in number of seeds that these two groups purchased was not significant, nor was the percent change in number of types of seeds purchased. When examining the purchases of farmers who earned more than the median income for sales of their crops, the picture is the same.

Most people who mentioned having heard or seen advertisements said that their purchases were influenced by the ads. One man said that the advertisements he had seen had given him the “courage” to try new inputs.

Hypothesis 6D: Farmers who increase input use will benefit

Hypothesis 6Di: Farmers who increase input use will have increased sales

Results. Hypothesis Not Supported

- Farmers who increased their input use did not have significantly increased income from sales of crops between 2003 and 2006. (*difference found was not significant: test of independent means*)

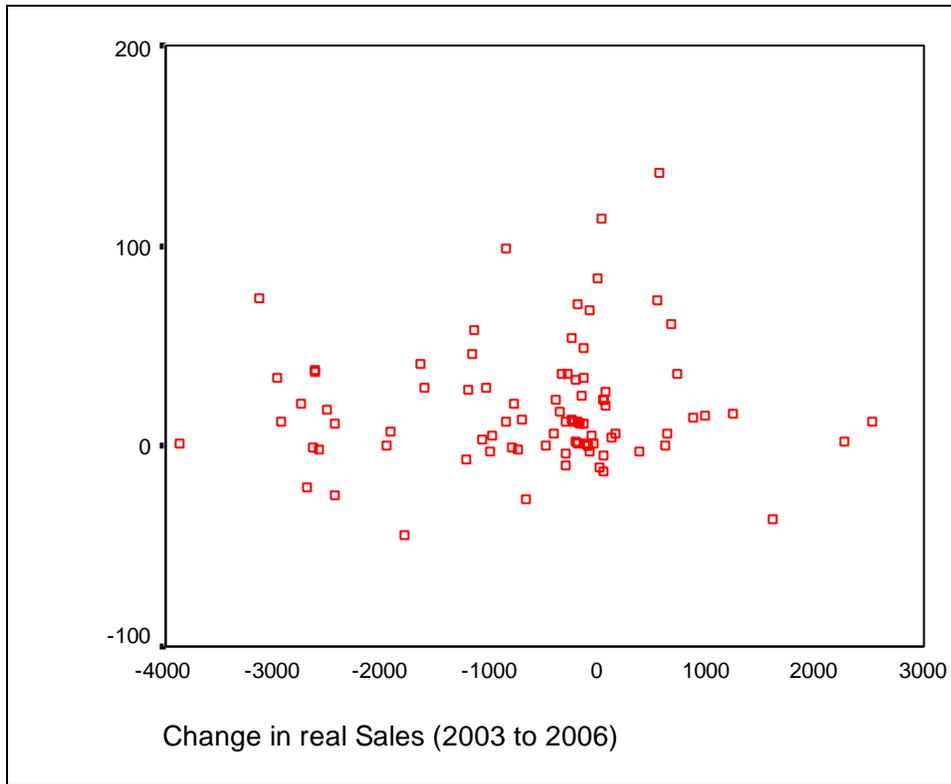
Data. Three aspects of this hypothesis were examined: 1) change in input purchases and change in sales (2003 to 2006); 2) farmer perception of change in earnings; and 3) 2006 agricultural input purchases and crop sales.

Change in Input Purchases and Change in Sales (2003 to 2006). There is no correlation between the change in amount spent on agricultural inputs and the change in amount earned from sales between 2003 and 2006. Neither is there a correlation between percent change in expenditures on inputs and percent change in earnings. When just those farmers who actually did increase their inputs spending are considered (that is, when the analysis drops those whose expenditures decreased or stayed the same), there is still no correlation. Even when the farmers whose incomes from crop sales dropped were removed from the analysis, there was still no correlation.

Below is a scatterplot that plots the difference in agricultural inputs costs between 2003 and 2006 (with the 2003 costs adjusted for inflation) and the change in sales reported by farmers. Note that the change in sales is problematic as it is calculated based on two disparate measures: actual sales of specific crops reported by farmers in the past two agricultural seasons, and the estimate of their income from crop sales over two seasons that they made in 2003. While the actual figures for the changes in sales themselves are not completely reliable in and of themselves (they appear to skew negative relative to other measures of income change), their relative relationship to the input costs should be valid. Note in particular here that this calculation gives a result of 73% of farmers having a decrease in sales over 2003. When asked if their sales

were better or worse in 2006 than in 2003, 43% of farmers said that their sales were “a little worse” or “much worse.” Still, in absence of more detailed data (and ignoring the placement of the 0 on the x-axis scale), this data does provide information on how costs and income are distributed relative to each other.

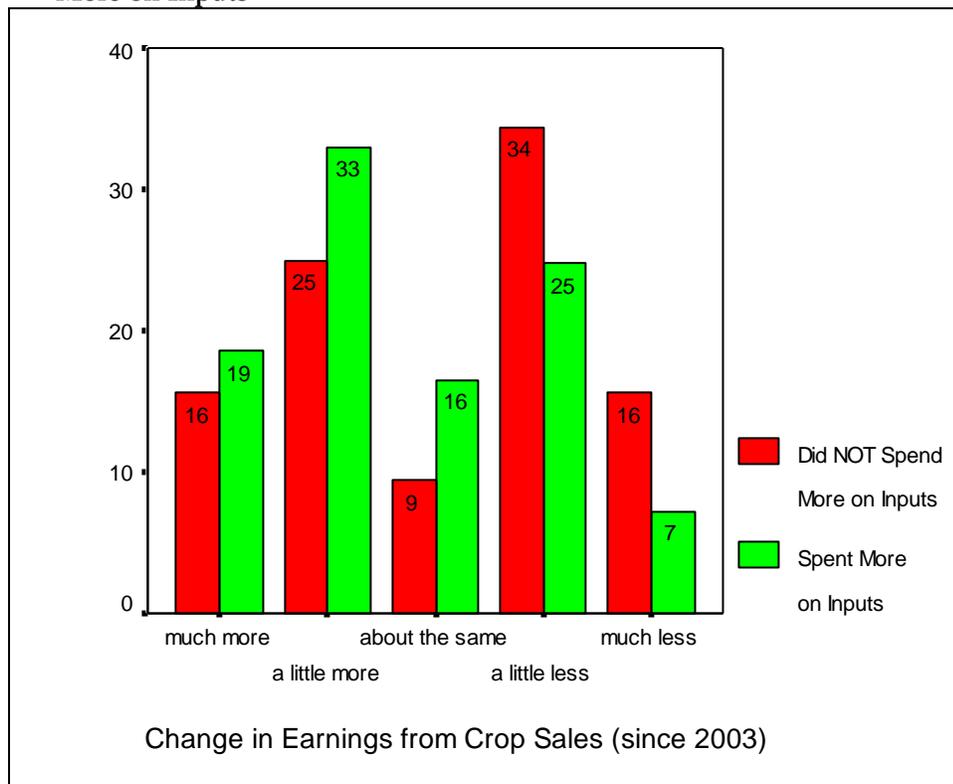
Figure 11: Relative Relationship between Change in Input Expenditures and Change in Income from Sales



• 8 outliers were removed.

Farmer Perception of Change in Earnings. In addition to reporting the actual amounts that they earned, farmers were asked to think about how they would categorize the change in their earnings from sales of their crops over the past two agricultural seasons and over the same two seasons 3 years ago. Then they were asked whether they felt that in the past two seasons they had earned 1) much more; 2) a little more; 3) about the same; 4) a little less; or 5) much less. Figure 12 below juxtaposes the responses for the 97 farmers who were in business in 2003 and who increased their real expenditures on inputs and for the 32 farmers who did not.

Figure 12: Difference in Change in Income from Sales by Farmers who Did and Did Not Spend More on Inputs

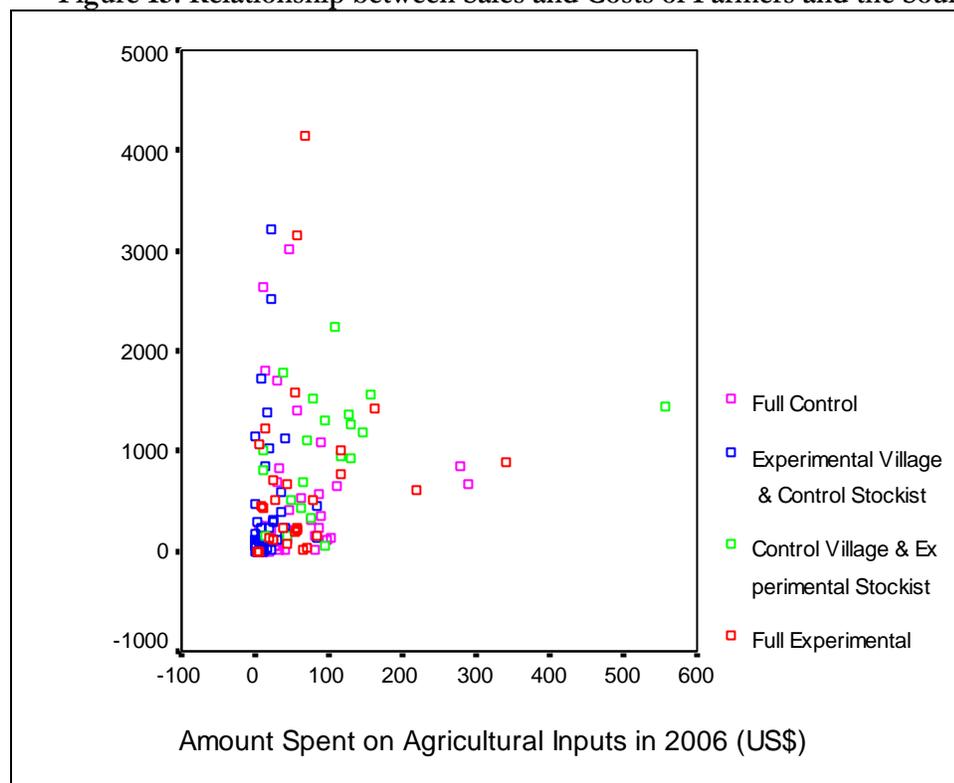


There was no significant difference in the amount actually spent on inputs among the farmers who placed themselves in these five earnings categories (ANOVA Tamhane's T2 post hoc test).

Interestingly, it appears that a higher percentage of farmers who did not spend more in inputs felt that their earnings were lower in 2006 than in 2003. For those who did spend more, just 32% said they had earned less from their crops sales in 2006. When farmer's opinions about their earnings from crop sales and their opinion about their overall profits are compared (see Section 6D), farmers whose spending on inputs increased appear to have had a more favorable assessment of their profits than of their earnings from sales. Fifty-three percent of farmers who increased their input purchases said that they thought that their income from crops had increased while 41% of those who did not increase their input purchases thought that their income from crop sales had increased. Meanwhile, 60% of farmers who purchased more inputs felt that they did better overall in 2006 than in 2003 while 40% of those who did not increase their input purchases felt that over all they did better. This may suggest that farmers who did better also were able to put more funds into input purchases.

2006 Agricultural Input Purchases and Crop Sales. To further examine the relationship between inputs and sales, purchases and sales just for 2006 were also examined. As the scatterplot in Figure 13 below demonstrates, the relationship between sales and input purchases is not completely clear.

Figure 13: Relationship between Sales and Costs of Farmers and the Source of their Purchases



There is a positive correlation between the amount spent on crop inputs and income from sales of crops (Pearson correlation coefficient of .208 is significant at the 0.05 level). There is stronger correlation between the amount spent on crop and tool inputs and income from sales of agricultural products (Pearson correlation coefficient of .312 is significant at the 0.01 level.) This is particularly the case with low levels of input purchases correlating more closely to low levels of sales. When examining the 113 farmers with sales of less than 1,500,000 Ush (US\$ 835), (75% of the sample), there is a positive relationship between input purchases and sales (the Pearson correlation coefficient of .412 is significant at the 0.01 level.)

However, the relationship between input purchases and sales is less clear at the higher levels. When looking at just those farmers who purchased fertilizers, pesticides or herbicides (expensive inputs that are not part of the average farmer's agricultural lexicon), the Pearson correlation coefficient drops to .174 and is not significant. When looking just at the 39 farmers with the top 25% of sales - sales of over 1,500,000 Ush (US\$ 835) - the correlation appears to become negative, though it is not statistically significant.

While some of these results are significant, the lack of a significant relationship between *change* in input purchases and sales may mean that these results are related to overall farm size and to simple income effects (the fact that farmers who earn more are able to purchase more inputs) rather than to any change in behavior on the part of farmers of stockists.

Discussion. In a variety of tests on the data for 2006 alone, as input expenditures go up, the correlation between the amounts spent on inputs and income from sales declines. The stronger correlation between low input purchases and low sales is likely simply an effect of poverty. Forty-seven percent of farmers said that they can't afford to buy additional inputs (don't ever have the cash) at all, and 58% percent said that they were constrained by not having cash available at the time when inputs were needed.

Farmers were also asked why they thought that their earning had gone up or gone down (see Table 32 below – note that not all farmers responded to this question, and some of those who did gave more than one reason). Twenty-seven of the 63 farmers responding cited using improved seeds and/or better production practices – both of which were promoted by stockists participating in the project – as reasons for their increased earnings.

Table 32: Reasons for Changes in Earnings between 2003 and 2006

Why Earnings Changed	Why Increased	Why Decreased
Used improved seeds	23	
Used better production practices	9	
Increased number of types of crops cultivated	10	
Added new crops or additional land	12	
Prices for crops increased	17	
Favorable weather conditions	12	
Lower yields		23
Pests and diseases		8
Prices for crops decreased		2

- *Not all farmers responded, and some farmers gave more than one reason, so the figures are not additive.*

Hypothesis 6Dii: Farmers who increase input use will have increased profit

Results. Hypothesis Not Supported

- Farmers who increased their input use did not perceive significantly increased profits.^{38, 39} (*difference found was not significant: test of independent means*)

Data. Because, as noted above, actual farmer profits are difficult to calculate, two proxies were examined: 1) change in costs vis a vis income from sales and 2) farmers’ perceived change in profits.

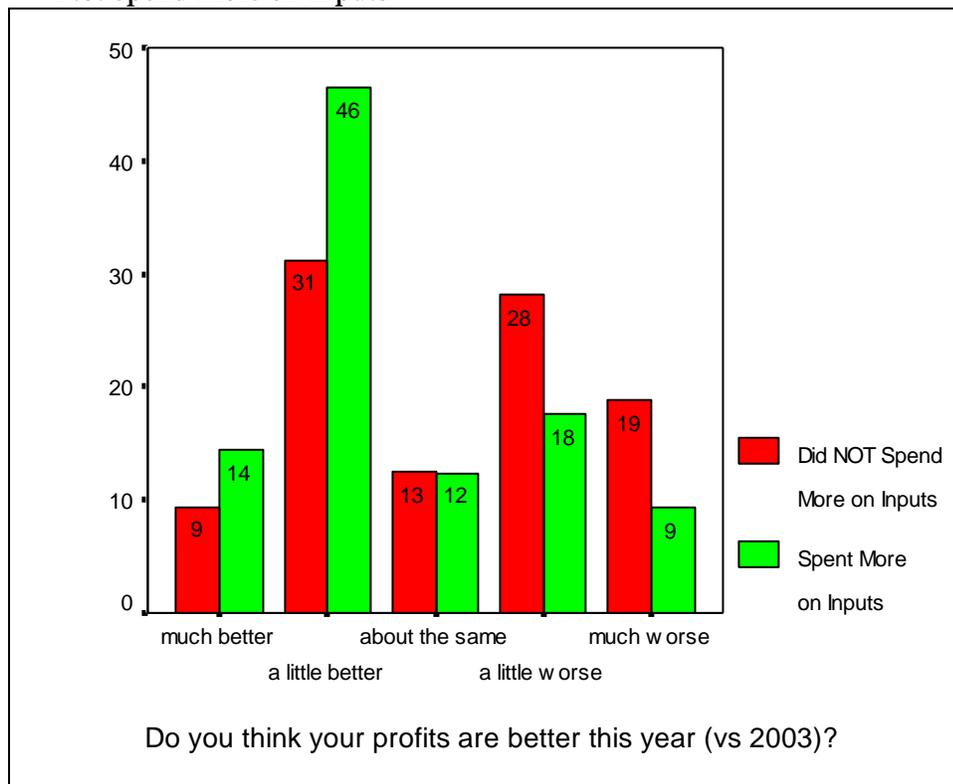
Change in Costs vis a vis Income from Sales. There is no correlation between the change in amount spent on agricultural inputs and the net difference between change income from sales and change in expenditures on seeds and agrochemicals between 2003 and 2006. Neither is there a correlation between percent change in expenditures on inputs and percent change in the net difference between sales and seed and agrochemical input costs. There is still no correlation when just those farmers who actually did increase their inputs spending are considered and when the farmers whose incomes from crop sales dropped were removed from the analysis.

Farmers’ Perceived Change in Profits. Farmers were asked to compare how well they felt they did overall between 2003 and 2006: 1) much better; 2) a little better; 3) about the same; 4) a little worse; or 5) much worse. Then they were to use the same rating scale for how they felt that in the past two seasons compared to the same two seasons in 2003. Figure 14 below juxtaposes the responses for the 97 farmers who increased their real expenditures on inputs and for the 32 farmers who did not.

³⁸ This section does not deal with literal profit but with a proxy for profit calculated simply by subtracting the amount spent on seeds and agrochemicals from income from sales. There were other purchased inputs, though relatively few farmers bought them. Farmers also had expenses such as field labor, plowing, and land rent. At the same time, farmers did not sell their entire output. The value of the crops produced and consumed in the household and saved for seed are not included here either.

³⁹ This section only considers those farmers who had seed or other input purchases in 2003.

Figure 14: Difference in Change in approximate Profits from Sales by Farmers who Did and Did Not Spend More on Inputs



There is no significant difference between the mean amounts spent on inputs between those who felt that they did a little bit or much better overall and those who felt that they did a little bit or much worse (independent means t-test). Neither to the mean changes in amounts spent on inputs and the mean percent changes in amounts spent show significance. Finally, there is no significant difference in the amount actually spent on inputs among the farmers who placed themselves in these five profits categories (ANOVA Tamhane's T2 post hoc test).

Discussion. Interestingly, the farmers who felt better about their overall profits (a little or much better) had increased their input spending by an average of 180% while the farmers who felt they did worse (a little or much worse) increased their input spending by an average of 55%. Those who felt that their profits stayed the same *reduced* their input spending by an average of 43%.

When asked why their overall profits had changed, farmers' most common response was that they had improved their use of inputs and hence gotten better yields. (See Table 33 below.) Their second most common response was that they had increased the number of types of crops that they cultivated, which had given them both more food and more income. Both of these responses refer to the types of changes that the project was working to teach stockists to support farmers to make.

Table 33: Reason for Changes in Profits between 2003 and 2006

Why Profits Changed	Why Increased	Why Decreased
Improved use of inputs, hence got better yields	49	
Increased number of types of crops cultivated, hence more food and income	25	
Prices were better	19	
Increased amount of land cultivated	18	
Weather was good	11	
Drought		20
Pests and diseases		14
Reduced yields		14

- *Not all farmers responded, and some farmers gave more than one reason.*

Hypothesis 7: Education, age, location and farm size affect farmer purchases of inputs

Hypothesis 7A: Age: Younger farmers are more likely to purchase inputs.

Results. Hypothesis Not Supported.

- Younger farmers do not spend significantly more on agricultural inputs. *(no statistically significant correlation)*
- Younger farmers do not buy significantly more types of inputs. *(no statistically significant correlation)*
- Younger farmers are not significantly more likely to choose to purchase agrochemicals than older farmers. *(difference found was not statistically significant: ANOVA: Tamhane's T2)*

Data. There was no correlation between age and amount spent on agricultural inputs (improved and ordinary seeds, fertilizers, pesticides and fungicides, and herbicides). There was no correlation between age and the number of types of these agricultural inputs that farmers purchased.⁴⁰

When farmers were divided into 3, 4 and 5 age groups, no significant difference was found between the amount that each age cohort spent on agricultural inputs. Neither was there any difference found in the number of types of inputs purchased by farmers in different age groups or in their likelihood to choose to make any type of agrochemical purchase. There is no correlation when whether or not they shopped with stockist trained by AT Uganda is factored in.

Hypothesis 7B: Education: Better-educated farmers are more likely to purchase inputs.

Results. Hypothesis Supported.

- Farmers with higher levels of education are more likely to spend more on inputs. *(statistically significant: correlation)*
- Farmers with higher levels of education are more likely to purchase a higher number of agrochemical inputs and of inputs in general. *(statistically significant: correlation)*
- Illiterate farmers are less likely to purchase inputs than farmers with primary educations. *(statistically significant: ANOVA: Tamhane's T2)*

⁴⁰ If anything, for those farmers who did purchase agrochemicals, there may a tendency towards older farmers buying more agrochemicals than younger farmers (correlation coefficient of .258, not statistically significant at .073).

Data

Correlations. Education level is positively correlated with the amount spent on agricultural inputs purchased (Pearson correlation coefficient of .238, significant at the 99% confidence level [and Kendall's tau_b at .224 also at the 99% confidence level]).

Education level is also positively correlated with the number of types of agricultural inputs purchased (Pearson correlation coefficient of .218, significant at the 99% confidence level and [Kendall's tau_b at .230, also at the 99% confidence level]). People with higher levels of education may also buy more agrochemical inputs (fertilizers, pesticides and fungicides, and herbicides) (Kendall's tau_b at .198, significant at the 99% confidence level).

Interestingly, the same pattern held for farmers who did not shop with stockists that participated in the project: the more highly educated farmers spent more on inputs and bought a wider variety of both agrochemical inputs and all inputs, no matter with whom they shopped

Differences among Groups. Two-thirds of farmers did not buy any agrochemical inputs at all. This does appear to be linked to education level. Nine percent of illiterate farmers bought agrochemical inputs and 30% of farmers with primary education did, along with 47% of those with ordinary secondary education and 50% of those with advanced secondary or tertiary education. (note, however, that education and income may be collinear.)

When the purchasing practices of farmers were compared based on educational level, illiterate farmers did show some significant differences with respect to the other groups. The difference in whether or not agricultural inputs were purchased at all was significant when comparing illiterate farmers to farmers with a primary school education (95% confidence level in Tamhane's post hoc ANOVA test). Illiterate farmers in the sample bought significantly fewer types of inputs than farmers with primary or ordinary secondary education (both with 99% confidence level in Tamhane's post hoc ANOVA tests). They spent less on agrochemical inputs than farmers with primary education and less on inputs overall than farmers with secondary ordinary education (both with 95% confidence level in Tamhane's post hoc ANOVA tests). There were no significant differences among farmers with primary, secondary ordinary, and more advanced education.

Discussion. The differences in input purchases of illiterate farmers and those with primary education may be intertwined with other factors such as age and income level. The observed correlations may be due in at least some part to the stockists who participated in the AT Uganda program. When just looking at farmers who lived in villages near participating stockists, education level was positively correlated with the amount spent on agricultural inputs and with total number of types of agricultural inputs as well as the number of types of agrochemical inputs. On the other hand, it looks as though farmers who did *not* shop with participating stockists spent more on inputs overall (Kendall's tau_b at .207, significant at the 95% confidence level).

Hypothesis 7C: Gender: Women farmers are less likely to purchase inputs

Results. Hypothesis Not Supported.

- Women farmers are not significantly less likely to purchase agrochemicals or seeds than men farmers. (*difference found was not significant: test of independent means*)

Data. Men and women farmers had no significant difference in their likelihood to purchase inputs in general or agrochemicals specifically. For the men and women farmers surveyed, there were no significant differences between the amount they spent on agricultural inputs or the number of types of agrochemical inputs that they

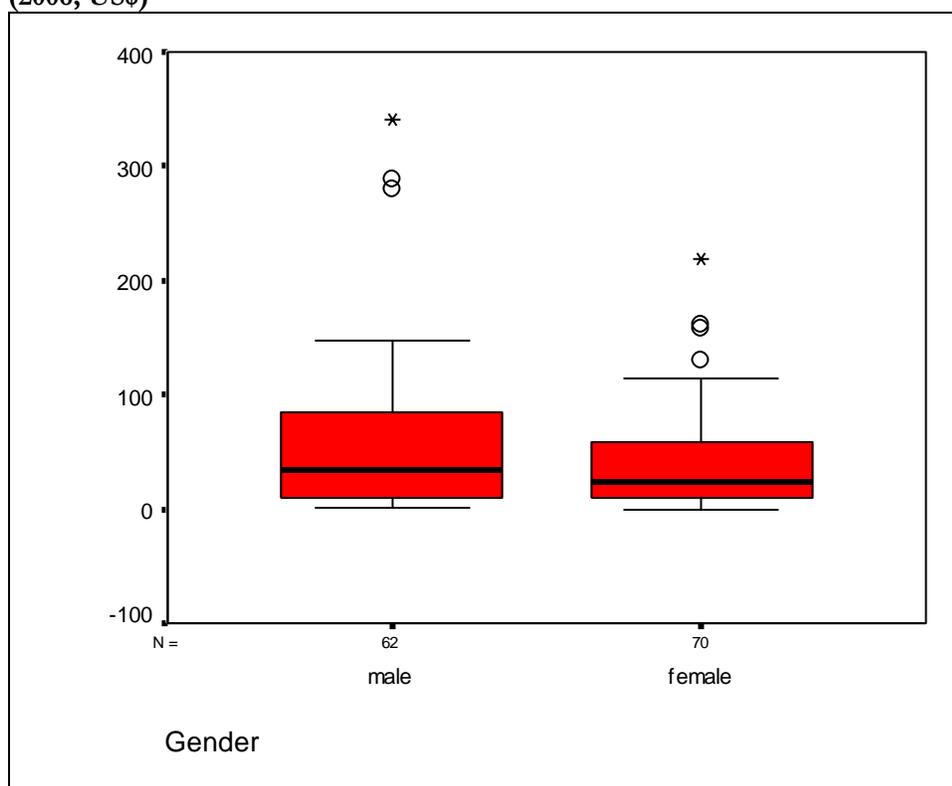
purchased. However, it may be that women do spend slightly less than men on inputs overall, but that women selectively spend more than men on agrochemicals (see Table 34 and Figure 15 below).

Table 34: Men and Women Farmers' Input Purchase Patterns

	Men		Women	
	% of men purchasing	Mean	% of women purchasing	Mean
<i>Amounts are in \$US</i>				
Spending on Inputs				
Mean Amount Spent on Inputs in 2006 (<i>all farmers</i>)	99%	\$50	100%	\$44
Mean Amount Spent on <u>Agrochemical</u> Inputs in 2006 (<i>only those farmers who purchased agrochemicals</i>)	35%	\$32	29%	\$38
Mean Amount Spent on <u>Agrochemical</u> Inputs in 2006 (<i>all farmers</i>)		\$11		\$11
# of Types of Inputs Purchased				
# of Types of Inputs Purchased in 2006 (<i>all farmers</i>)	99%	5.25	100%	4.88
# of Types of Agrochemical Inputs Purchased in 2006 (<i>only those farmers who purchased agrochemicals</i>)	35%	1.84	29%	1.64
# of Types of Agrochemical Inputs Purchased in 2006 (<i>all farmers</i>)		0.66		0.47

- No statistically significant differences were found.
- The top 5 outliers have been removed.
- Figures in bold are the highest in each category.

Figure 15: Amount Spent on Agricultural Inputs by Men and Women Farmers (2006, US\$)



Discussion. While gender is obviously a critical consideration, no significant differences were found here. Women have a primary role in agriculture in Uganda, and it may be that gender itself is not a critical factor in farming decisions in the region studied. It may be that the project effectively took gender considerations into account and assisted in balancing the observed results.

Hypothesis 7D: Farm Location: Farmers in remote areas are less likely to purchase inputs than those in peri-urban areas.

Results. Hypothesis Not Supported.

- Farmers in remote areas are **not** less likely to purchase inputs than farmers near the large towns of Mbale and Masindi. (difference found was not significant: test of independent means)
- Farmers in rural areas spent more on inputs and bought more types of inputs than did farmers near the large towns of Mbale and Masindi. (significant difference: test of independent means)

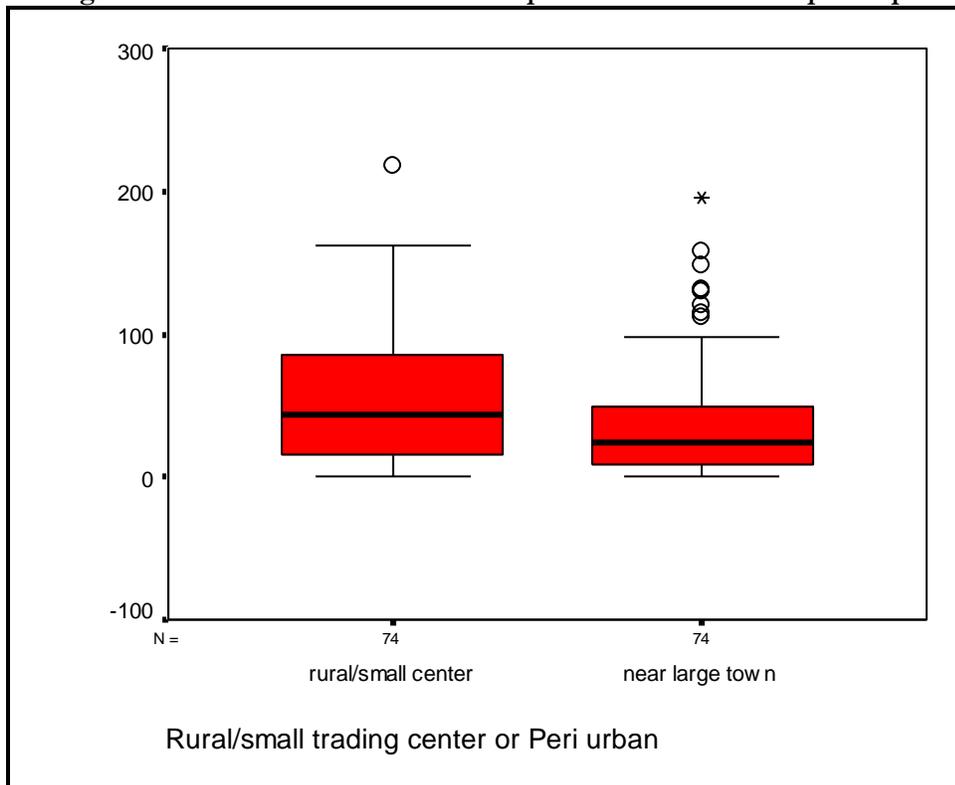
Data. The distance of a farm from a large town made no difference in the whether or not a farmer purchased agrochemicals or other agricultural inputs. During the most recent two agricultural seasons, farmers in rural areas who lived in small villages or near small towns or trading centers spent an average of US\$ 54 on agricultural inputs (seeds and agrochemicals) while their counterparts closer to the large towns of Mbale and Masindi spent an average of US\$ 40 on those inputs (See Table 35 below). To more fully capture actual costs during the entire span of the agricultural calendar, farmers were asked to calculate these costs for the most recent two full agricultural seasons: the second season of 2005 and the first season of 2006. Of the input expenditures in the past two seasons, about a quarter of the funds went to agricultural chemicals: 22% (US\$12) for rural farmers and 25% (US\$10) for farmers near the large towns. (See Table 35 and Figure 16.)

Table 35: Input Spending Patterns and Location of Farm

	Farmers near Mbale and Masindi Towns		Farmers in Rural Villages and Trading Centers	
	% of Peri-urban farmers purchasing	Mean	% of Rural farmers purchasing	Mean
<i>Amounts are in \$US</i>				
Spending on Inputs				
Amount Spent on Inputs in 2006	100%	\$40	100%	\$54*
Amount Spent on <u>Agrochemical</u> Inputs in 2006 (<i>only those farmers who purchased agrochemicals</i>)	25%	\$31	39%	\$38
Amount Spent on <u>Agrochemical</u> Inputs in 2006 (<i>all farmers</i>)		\$10		\$12
# of Types of Inputs				
# of Types of Inputs Purchased in 2006	100%	4.57	100%	5.60*
# of Types of Agrochemical Inputs Purchased in 2006 (<i>only those farmers who purchased agrochemicals</i>)	25%	1.75	39%	1.71
# of Types of Agricultural Inputs Purchased in 2006 (<i>all farmers</i>)		0.47		0.65

- Independent samples t-test: * denotes significant difference in means at the .05 level).
- The top 5 outliers have been removed.

Figure 16: Distance of Farm from a Population Center and Input Expenditures



Discussion. It is clear that farmers who lived farther from population centers spent more on agricultural inputs, but it is not clear why this is the case. The higher amount spent on inputs by farmers in rural areas might be related to having the cost of transport impact input prices, but price differentials (if any) were not examined in this research. It may also be that people in more rural areas are poorer in general and thus buy in smaller (and therefore more expensive) quantities. The sample purposively included an equivalent number of farms classified as small and large in the rural areas and in areas near the large towns in the study region. There was no significant difference in the size of farms in rural areas and areas closer to the large towns, so farm size would not have strongly influenced the increased amount spent on input purchases in rural areas. Whether a farmer lived in a rural village, a small town or trading center or near the large towns of Mbale or Masindi made no significant difference in whether or not they purchased agricultural inputs in general or agrochemicals specifically.

VII. CONCLUSIONS

The following is a summary of the results of the hypothesis testing for the stockists and farmers who responded to our questionnaires along with overall conclusions based on the data. Details are laid out in Section VI above, and a summary of the central statistically significant results is in the Executive summary.

As noted above, the hypotheses tested in this report were formulated for the overall BDS study that included research in India and Azerbaijan as well as this research in Uganda. The following is a list of research hypotheses and their results for Uganda. Note that while these are based on the overall BDS research hypotheses, some modifications were made to tailor them to the project being studied in each country.

LARGE-SCALE WHOLESALERS, DISTRIBUTORS AND INPUT SUPPLIERS

Hypothesis 1: Training and credit access for retailers will lead to suppliers and distributors experiencing increased demands for their products and varying their products and services to capture new markets.

There are a limited number of large-scale businesses that supply stockists. Ten suppliers and distributors were interviewed. The small number precluded hypothesis testing.

Hypothesis 1A: Demand for products and services from trained stockists will increase

Not Tested

Hypothesis 1B: Stockist access to credit will reduce sales of distributors who offer informal credit (as stockists have options to purchase from suppliers they prefer)

Not Tested

Hypothesis 1C: Distributors who face losing customers will vary and/or improve their products and services

Not Tested

STOCKISTS: IMPACTS OF THE MERCY CORPS BDS PROJECT: RESULTS FROM THE HYPOTHESIS TESTING

Hypothesis 2: Training of Input Retailers will lead to increased demand for their products and services

Hypothesis 2A: BDS training leads to increased demand for products and services

Inconclusive:

- Stockists who participated in the AT Uganda trainings do not have significantly more customers
- Stockists who received BDS training had significantly higher costs for the first season of 2006 and for the entire year

- *While the number of surveyed stockists who were already in business in 2003 is too small to allow for statistical testing of a number of aspects of this hypothesis. However, the data suggest that stockists who participated in the AT Uganda trainings*
 - *appear to have higher income from sales of improved seed, pesticides and fungicides, and small tools*
 - *appear to have a smaller increase in sales of improved seed, pesticides and fungicides appear to have lower yearly sales and a lower change in yearly sales*
 - *appear to have a smaller increase in expenditure on input inventory*
 - *appear to have different patterns in sales of specific agricultural input products*

Hypothesis 2B: More BDS training leads to higher sales

Inconclusive:

- BDS training did not lead to higher overall income from sales.
- However, smaller stockists who received BDS training did sell more pesticides and fungicides.
- For stockists below the 75th income percentile there was a positive correlation between the number of trainings a stockist attended and his or her sales of pesticides and fungicides
- For all stockists surveyed:
 - The more BDS trainings a stockist has attended, the lower his or her overall yearly 2006 sales and change in sales since 2003 are likely to be.
 - Stockists trained by AT Uganda have lower incomes in 2006 and lower changes in income since 2003 than stockists not trained by AT Uganda.
 - There was no significant difference in overall sales of agricultural inputs by stockists who received training and those who did not.

Hypothesis 2C: BDS trained stockists will offer a wider variety of products and services

Supported

- Stockists who participated in AT Uganda training offered a wider variety of services.
- The more trainings a stockists attended, the wider the variety of products and services he or she offered
 - *While the numbers were too small to allow for statistical testing, stockists who received training from AT Uganda appear to have had a greater percentage increase in the number of customers to whom they provide verbal advice.*

Hypothesis 3: Access to credit will significantly improve the products and services offered by retailers (in amount and quantity) and will result in an expanded market for the goods and services offered.

Hypothesis 3A: Membership in a credit guarantee association will increase access to credit from businesses besides wholesale distributors

Inconclusive:

- While participating stockists were more likely to access credit of any type than non-participating stockists, the credit they accessed was largely credit from wholesale distributors that was facilitated by the project. Very few participating stockists accessed other types of credit.
- *While the number of stockists participating in the AT Uganda credit guarantee program is too small to allow for statistical testing, membership in this credit program does not appear to increase access to credit from other sources.*

Hypothesis 3B: Training with access to credit leads to higher increase in demand for products and services as measured by sales and net profit

Inconclusive: *The number of stockists who received both credit and training was too small to allow for statistical testing.*

Hypothesis 4. Demographic characteristics will affect the degree to which retailers take advantage of training and new credit opportunities

Hypothesis 4A: Younger stockists will have higher increases in sales

Partially Supported.

- While there is a significant negative correlation between age and increases in sales, this is largely due to the increase in sales by stockists between ages 36 and 47.
- Younger shop owners tend to have higher changes in overall yearly sales than older stockists.
- Shop owners between the ages of 36 and 47 have significantly higher change in sales than stockists in both older and younger age groups.

Hypothesis 4B: Better educated stockists will have higher increases in sales

Not Supported: Better educated stockists did not have greater increases in sales between 2003 and 2006.

Hypothesis 4C: Women stockists will employ fewer assistants

Inconclusive. *The number of women stockist respondents was too small to allow for statistical testing. However, women stockists appear to have more assistants and more paid employees than male stockists, and male stockists appear to have more family assistance than women stockists.*

Hypothesis 4D: Women stockists will have lower profits

Inconclusive: *The number of women stockist respondents was too small to allow for statistical testing.*

Hypothesis 5. Size of business at project outset and location will affect impact of credit and training on retailers. (Stockist Size/location)

Hypothesis 5A: Trained stockists with larger initial sales volumes will improve sales more than small stockists

Inconclusive. *The number of trained stockists for whom data was available for both 2003 and 2006 was too small to allow for statistical testing. However, stockists who had larger initial sales income in 2003 appear to have smaller increases in sales between 2003 and 2006 than do stockists who had larger initial sales volumes*

Hypothesis 5B: Stockists with larger initial sales volumes will have greater access to credit

Partially Supported

- For just those stockists who received credit, the higher a stockists' 2003 sales volume, the higher the amount of credit that they used.
- When all stockists were considered, there was no significant correlation between sales volume and amount of credit used.

Hypothesis 5C: Stockists located close to wholesalers and/or large suppliers will have greater increases in sales and profits

Inconclusive. *There were not enough stockists located close to wholesalers and large distributors in Mbale and Masindi to allow for statistical testing. However, the data suggest that*

- *Stockists whose shops were directly in the capital towns of the districts of Mbale and Masindi appeared to have higher estimated increases in overall yearly sales, costs and profits between 2003 and 2006 than stockists whose shops were in outlying towns, trading centers or village.*
- *Stockists who lived outside the towns of Mbale and Masindi appeared to have increased their spending on agricultural input inventories by about two times more than the stockists in the large towns who lived close to the wholesalers and distributors.*

FARMERS: IMPACTS OF THE MERCY CORPS BDS PROJECT: RESULTS FROM THE HYPOTHESIS TESTING

Hypothesis 6. As a result of the project, farmers will purchase increased amounts of inputs, find new market outlets and experience greater volume of production, sales and profits

Hypothesis 6A: Improved stockist marketing will result in increased farmer purchases of inputs

Supported:

- Most farmers who saw or heard advertising about inputs said that the advertising influenced their input purchase decisions.

Hypothesis 6B: Farmers who purchase from program stockists will make more from sales of their products

Supported:

- Farmers who shop with a stockist trained by AT Uganda have significantly higher income from sales of their products than farmers who do not.
- However, farmers who shop with an AT Uganda-trained stockist have significantly higher agricultural input costs.
- It is not clear whether these farmers had higher profits. Costs of farming include such elements as land, labor, cost of purchasing food not grown by the household, forgone income, etc., many of which could not be monetize accurately as part of this study. Because of this, full costs – and profits - can not be meaningfully calculated here.

Hypothesis 6C: Farmers who already purchase inputs will increase amount of inputs used if they are given marketing information, visit a demonstration plot, or have been exposed to media advertising

Hypothesis 6Ci: Farmers who already purchase inputs will increase the amount of inputs used if they are given marketing information

Inconclusive: *Too few stockists purchased specialized seed or agrochemicals in 2003 to allow for statistical testing. However, the data suggest that farmers who report receiving information on marketing locations and prices for their products did not increase the amount they spend on inputs.*

Hypothesis 6Cii: Farmers who already purchase inputs will increase amount of inputs used if they have seen a demonstration plot

Inconclusive: *While the number of farmers who reported seeing a demonstration plot was too small to allow for statistical testing, the data suggests that visiting a demonstration plot may have an impact on how farmers choose to spend their input money. Farmers who have seen a demonstration plot appear have a greater relative increase in spending on agrochemicals. Farmers who have not seen a demonstration plot appear to have a greater relative increase in spending on seeds.*

Hypothesis 6Ciii: Farmers who already purchase inputs will increase amount of inputs used if they have been exposed to media advertising

Partially Supported

- Farmers who heard radio advertisements had larger increases in the number of types of seeds that they purchased.
- There was no significant difference in the amount that they spent on seeds.

Hypothesis 6D: Farmers who increase input use will benefit

Hypothesis 6Di: Farmers who increase input use will have increased sales

Not Supported:

- Farmers who increased their input use did not perceive significantly increased income from sales of crops between 2003 and 2006.

Hypothesis 6Dii: Farmers who increase input use will have increased profit

Not Supported:

- Farmers who increased their input use did not perceive significantly increased profits

Hypothesis 7: Education, age, location and farm size affect farmer purchases of inputs

Hypothesis 7A: Younger farmers are more likely to purchase inputs

Not Supported

- Younger farmers do not spend significantly more on agricultural inputs

- Younger farmers do not buy significantly more types of inputs.
- Younger farmers are not significantly more likely to choose to purchase agrochemicals than older farmers.

Hypothesis 7B: Better-educated farmers are more likely to purchase inputs

Supported

- Farmers with higher levels of education are more likely to spend more on inputs.
- Farmers with higher levels of education are more likely to purchase a higher number of agrochemical inputs and of inputs in general.
- Illiterate farmers are less likely to purchase inputs than farmers with primary educations.

Hypothesis 7C: Women farmers are less likely to purchase inputs

Not Supported:

- Women farmers are not significantly less likely to purchase agrochemicals or seeds than men farmers.

Hypothesis 7D: Farmers in remote areas are less likely to purchase inputs than those in peri-urban areas.

Not Supported

- Farmers in remote areas are **not** less likely to purchase inputs than farmers near the large towns of Mbale and Masindi.
- Farmers in rural areas spent more on inputs and bought more types of inputs than did farmers near the large towns of Mbale and Masindi.

BROADER CONSIDERATIONS

Project-sponsored Advertisements were Effective in Providing Information to Farmers. Even farmers who received no advice from the people from whom they bought inputs reported hearing advertisements on the radio – and said that their purchases and practices were influenced by the advertisements. It appeared that different means of providing information to farmers had different impacts: while statistical testing on this was not possible, it appears that radio advertising was effective for getting farmers to try new seeds, while farmers influenced by demonstration plots tended to spend more on seeds. Still, some farmers who said that they heard advertisements – and heard their neighbors talking about improved yields – said that they did not buy inputs because they could not afford the purchase price. One farmer who did purchase some improved inputs noted that his main limitation in increasing inputs is still money, “Whatever comes out from sale of produce cannot be reinvested due to many pressing problems.”

Sustainability of Impacts. The fact that this study was conducted well after the project had closed allowed for some aspects of sustainability to be seen, and many of the main thrusts of the project appear to be still functioning. It appeared that the relationships between suppliers and stockists that the project helped build through the credit guarantee program may have continued to be useful to both groups. While the project’s link with UNADA (Uganda National Agro-Inputs Dealers Association) was clearly seen to be important by stockists and large-scale suppliers alike, there were some questions about the sustainability of some of the

activities that the project had supported, with project-affected stockists in both focus group discussions among noting the UNADA's local activities had dwindled or become dormant. Stockists appeared to be continuing to provide many of the services to farmers that the project had promoted. The exception was that it appeared that some of them had stopped using demonstration plots as a means to teach farmers about inputs (the project had provided significant support to the establishment and maintenance of these plots).

Lack of Effective Markets for Agricultural Products. One very important aspect of farmer poverty appears to be the aspects of the value chain relating to sales of farm products. While farmers can improve the quality of their production by such means as the purchase of improved seeds, where there is little to no differentiation in market price for high vs. low quality products and a paucity of places to sell their products beyond local markets, the marginal returns to increased investment can be low, or even negative. Several stockists and suppliers pointed out that it was hard to convince farmers to use improved seeds or agrochemicals when there was no market price differentiation for improved products. While 88% of farmers said that it was “easy” or “very easy” to find buyers during peak season, they typically sold their goods at harvest time at local markets where prices paid were low compared to prices at other times of the year and in other places. A few stockists reported that they purchased farmers' products, but there was very limited coverage and it was unclear whether this provided a draw to farmers. Many stockists did provide information on places to market products, but this was of limited utility to small farmers as the economies of scale and transaction costs for getting their small harvests to market were daunting. As one woman put it, “the stockist gives advice on markets if a farmer has enough quantities, but with small quantities [I] just take it to the market.”

Overall Impacts. The project appeared to be successful in training stockists to improve their ability to help farmers. The advertising supported by the project was seen as influential by farmers. The credit guarantee program supported by the project was effective in helping stockists to purchase inputs from suppliers – and in helping suppliers secure repayment from potentially delinquent borrowers.

However, the ultimate impact on stockist – and farmer – profits is unclear. The data here do not support a conclusion that stockists who received BDS support had higher profits. The farmers who shopped with stockists who received BDS support did spend more on inputs and did make more from sales of their products. However, their earnings from sales of farm products were not significantly different from those of farmers who shopped elsewhere.

At the root of stockists' earnings is farmers' ability to pay to purchase inputs from them. And at the root of farmers' ability to pay is their ability to earn income from the sales of their crops. While the project's credit guarantee program helped stockists have increased access to capital to purchase inputs, and at the same time allowed them breathing room to provide informal credit to farmers, farmer ability to pay for inputs continues to be a barrier to increased input sales. This poverty seems to color all aspects of this area of the value chain.

Both stockists and large-scale suppliers noted that farmers are reluctant to increase their spending on inputs when they see few prospects for increased earnings from sales. Part of this has to do with the level to which farm families quite simply subsist on what their farm produces: 22% of farmers surveyed report that they consume 76-100% of their farm products within the household. Farmers who are lower resourced appear to be less able to take advantage of the informational and educational resources that BDS-trained stockists can offer. While the project did encourage stockists to function as middlemen and to purchase farmer harvests, it did not appear that many stockists or farmers did this.

The primary drag on improving the profits of both stockists and farmers continues to be farmer poverty, which itself appears to be linked to farmers' limited options for selling their products. This poverty, and the structures that maintain it, appear to be so entrenched that Business Development Services, while clearly appreciated by both stockists and farmers, may be, by themselves, insufficient to significantly improve the profits of stockists and farmers in this region of Uganda.

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ANNEX 1: STOCKIST QUESTIONNAIRE

Uganda STOCKIST Survey 2006

Introduction: Main Points

1. My name is _____
2. I am working for Weidemann Associates in the United States.
3. *(We spoke with you 3 years ago, and now we have come back to talk with you again to see how things have changed for you over the past 3 years.)*
4. Why we are doing this research:
 - This is a survey sponsored by Weidemann Associates in the United States.
 - It is an international study in 3 countries, (Azerbaijan, Uganda, and India)
 - With your cooperation, the results from this survey will help policy makers better understand what helps stockists and farmers make their businesses stronger, so that they can support their families and children.
 - We want to know more about what actually helps or hurts stockists like you to provide your services, sell products that help the farmers that are your customers, expand what you offer, and increase your profits.
 - The time and information that you provide us will be very helpful for people in many countries.
5. This will take about a half an hour.
6. All the information that you share in this survey will be kept strictly confidential. (Explain confidentiality thoroughly)
 - Though we will be asking you for your name and address, this is only so that we can link the information you give us today with the information you gave us three years ago. This is only for our own records and will not be shared with anyone.
 - Your name will not be kept in the same place with the information you provide us today.
7. You do not have to talk with me, but your answers will be very helpful.
8. Do you have any questions?
8. Do you agree to be interviewed?
9. Thank you very much.

Name of Respondent: _____

Village: _____

Sub-county: _____

Parish: _____

Locations Served (Villages/areas): _____

Location Mbale / Masindi (*circle one*)

Business Address: _____

Name of Shop _____

Part I: Business, Products, and Services Information

1. How long has this business sold agricultural inputs?
 ___ years ___ months
2. Are you the owner or an employee?
 - a. Owner
 - b. Clerk/Employee
 - c. Other [specify] _____
3. If they are an employee: How long have you worked here?
 ___ years ___ months

If less than two years, ask if there is someone you can speak to the owner or someone who has worked here for at least 3 years (or since the business started)– and start the interview over.

4. Including you (and the owner), how many people work here? _____
5. Employment status of each person:

		Full time		Part time/seasonal	
		Male	Female	Male	Female
a.	Paid				
b.	Unpaid/labor exchange				
c.	Family				
e.	Other				

6. What is your best estimate for what percentage of your customers are from large farms (*bigger than 5 hectares*) and what percentage are from small farms (*smaller than 5 hectares*)? (*mark a percentage and it must sum to 100*):
 - a. _____% Large farms
 - b. _____% Small farms
7. 3 years ago, what percentage of your customers are from large farms (*bigger than 5 hectares*) and what percentage are from small farms (*smaller than 5 hectares*)?
 - a. _____% Large farms (*bigger than 5 hectares*)
 - b. _____% Small farms (*smaller than 5 hectares*)
8. What is your best estimate for the percentage of your customers who are women? _____%
9. 3 years ago, what percentage of your customer were women?
 _____%

10. What is your best estimate of where your customer base lives (*mark a percentage and it must sum to 100*):
 - a. _____% peri-urban
 - b. _____% rural
11. What is your best estimate for whom you sell to (*mark a percentage and it must sum to 100*):
 - a. _____% Farmers connected to farmer’s association
 - b. _____% Organizations
 - c. _____% Individual farmers
12. How many customers do you think you have now? _____
13. 3 years ago, how many customers do you think you had? _____

Part II: Business Sales and Expenses

Now, I would like information in respect to your business sales and costs last year. Do you have records of your annual sales?

If have records, use them to help answer questions 14 - 14.

Please tell me about the types of agricultural *input* products that your enterprise sells to retailers and farmers in the now – and 3 years ago. (fill in the table below)

14. What products do you sell? (please probe)
15. How many types or varieties of this product do you provide now?
16. How much did you earn selling this type of product last season?
17. How many types or varieties of this product did you provide 3 years ago?
18. How much did you earn selling this product during this season 3 years ago?

	Products	This Season		2 nd Season 3 Years Ago	
		# of types (varieties) of this product (15)	Income from this product (if free write 0)(16)	# of types (varieties) of this product (17)	Income from this product (if free write 0)(18)
a.	Improved Seed/planting materials				
b.	Ordinary Seed/planting materials				
c.	Fertilizers				
d.	Pesticides/ Insecticides/Fungicides				
e.	Herbicides				
f.	Animal feed				
g.	Animal drugs				
h.	Tools (e.g., equipment, pangas, axes, sprayers)				
i.	Equipment rental (e.g., tractor services)				
j.	Other: [specify]				
k.	Other: [specify]				

Use Questions 19 – 23 to fill in the next table.

19. Please list all the agricultural *services* this business offers to stockists or farmers now: (please probe) [mark “x” if offered]
20. How many people used this service this year?
21. How much did you earn from each of these services this year? [if free, write “0”]
22. Please list all the agricultural *services* this business offered to stockists or farmers 3 YEARS ago: (please probe)
23. How many people used this service 3 years ago?
24. How much did you earn from each of these 3 YEARS ago. [if free, write “0”]

	Services	This Year			3 Years Ago		
		Service offered (19)	# people (20)	Income from Service (21)	Service offered (22)	# people (23)	Income from Service (24)
a.	Training through a demonstration plot						
b.	Formal training classes for farmers [specify topics]						
c.	Printed information about using inputs (seed variety, applying chemicals)						
d.	Advice (verbal) about using inputs (seed variety, applying chemicals)						
e.	Information about market prices for sale of farm products (crops and animals)						
f.	Information about other places/markets to sell produce and livestock						
g.	I buy farmer’s products directly (and resell them)						
h.	Discount/sale prices			-----			-----
i.	Credit Sales (for trusted customers)			-----			-----
j.	Promotion for new products and services		---	-----		---	-----
k.	Advertising (radio, newspaper, leaflets, etc.)		---	-----		---	-----
m.	Other: [specify]						
n.	Other: [specify]						

25. When you think about all of the goods and services that you offer, which are your three most profitable goods or services? [circle in the 2 tables above]

26. How do you determine how much to charge for an input or service when you sell it? Please explain: _____

27. You said that you offer _____ (name the services/products mentioned in Questions 14 through 24 above) for free. Why do you offer these for free?

COSTS CALCULATIONS

Now, do you have records of business costs?

If have records, use them to help answer questions 28 - 42.

Please use Questions 28 - 33 to fill in the table below.

28. Which items or services did you provide in 2006? (mark "x")

29. Which items or services did you provide in 2003? (mark "x")

30. What did it cost you to purchase the items that you sold this season?

31. What did it cost you to purchase the items that you sold during the first season of 2006?

32. What did it cost you to purchase the items you used during the second season of 2003?

33. What did it cost to purchase the items that you used the 1st season of 2003?

	Products/Services	Had in 2006 (29)	Had in 2003 (30)	Value this season (31)	Value 1 st season 2006 (32)	Value 2 nd season 2003 (33)	Value 1 st season 2003 (34)
a.	Improved Seed/ planting materials						
b.	Ordinary Seed/ planting materials						
c.	Fertilizers						
d.	Pesticides/ Insecticides/ Fungicides						
e.	Herbicides						
f.	Animal feed						
g.	Animal drugs						
h.	Tools (e.g., equipment, axes, pangas, sprayers)						

i.	Equipment rental (e.g., tractor)						
j.	Other: [specify]						
k.	Other: [specify]						

Please use Questions ** - ** to fill in the table below.

34. What other *monthly* operating costs does your business pay for now? (fill in monthly amount) This section includes things to use as probes if not already mentioned. If mentioned above, do not include here)

35. What other *monthly* operating costs did your business pay for 3 YEARS AGO?: (fill in monthly amount)

	Types of Costs	Amount Now	2003 Amount
a.	Monthly rents		
b.	Utilities		
c.	Employee salaries		
d.	Payments to others – extension workers		
e.	Employee benefits or other payments		
f.	Fuel and transportation costs		
g.	Loan Payment/interest		
h.	Business Communications		
i.	Information services		
j.	Other: [specify]		
k.	Other: [specify]		

Please use Questions 36 - 37 to fill in the table below.

36. What other *non-monthly* or *seasonal* or *occasional* operating costs did your business pay for in the past year: This section includes things to use as probes if not already mentioned. If mentioned above, do not include here)

37. What other *non-monthly* or *seasonal* or *occasional* operating costs did your business pay for 3 years ago?

		During past year		3 Years Ago	
	Types of Costs	Amount each time	How often?	Amount each time	How often?
a.	Seasonal employee salaries				
b.	Payments to others – extension workers				
c.	Advertising services				
e.	Payments for demonstration plots				
g.	Other: [specify]				

38. What were your
- COSTS from November 2005 to October 2006 = _____
 - COSTS from November 2002 to October 2003 = _____
 - SALES from November 2005 to October 2006 = _____
 - SALES from November 2002 to October 2003 = _____

39. Now I would like to estimate your yearly COSTS for your input sales enterprise.
- About how much did you spend so far this season? _____
 - About how much did you spend during this season 3 years ago?

 - About how much did you spend the first season of 2006?

 - About how much did you spend during the first season 3 years ago?

40. Now I would like to estimate your yearly SALES for your input sales enterprise.
- About how much was your gross sales for goods and services offered so far this season? _____
 - About how much how much was your gross sales during the 2nd season in 2003 (3 years ago)? _____
 - About how much was your gross sales for goods and services offered in the first season of 2006? _____
 - About how much how much was your gross sales during the 1st season in 2003? _____

41. Compared to last year, would you say that your business profits are now (circle one)
- Very much* better
 - Somewhat* better
 - About* the same
 - Somewhat* worse
 - Much* worse

If different: What is the difference between now and last year?

(write in answer – use the back of the page if necessary)

42. Compared to 3 YEARS AGO in 2003, would you say that your business profits are (circle one)
- Very much* better
 - Somewhat* better
 - About* the same
 - Somewhat* worse
 - Much* worse

If different: What is the difference between now and 3 YEARS AGO (2003)?

(write in answer – use the back of the page if necessary)

Part III: Information About and Access to BDS

43. What percentage of the business is devoted to selling agricultural inputs only? _____
44. Are you a member of Uganda National Agro Inputs Dealers Association (UNADA)? (circle one only)
- Yes/No
If yes, from when to when?
 - From _____, _____ (month, year)
 - To _____, _____ (month, year)
45. Have you ever received services from or participated in activities with AT-Uganda? (circle one only)
- Yes/No
If yes, from when to when?
 - From _____, _____ (month, year)
 - To _____, _____ (month, year)
 - About how many trainings have participated in?

46. Do you participate in any other projects with or any other organizations?
- Yes
 - No
- If yes, specify which project(s) _____

Please use the following 4 questions to fill in the table below:

47. In the last 3 years, what types of assistance or training to improve your input sales business have you received?

If training mentioned, list practices and techniques presented to the respondent (*please probe*)

If no assistance was received, skip to Question 53.

48. Who did you receive this from?

49. How much did you pay for the service?

50. Overall, how would you rate your level of satisfaction with each service you obtained? (*circle one in the table below*)

- a. **Extremely** satisfied (I would do it again and pay for it myself)
- b. **Very** satisfied (I would do it again if someone pays for part of it)
- c. **Somewhat** satisfied (I would **only** do it again if someone pays for it)
- d. **Disappointed** (it was a waste of my time)

Service	Describe (<i>please probe</i>) (# 48)	From Whom (# 49)	Cost (# 50)	Satisfaction level (# 51) (<i>circle one</i>)
a. Training				Extremely Very Somewhat Disappointed
b. Training				Extremely Very Somewhat Disappointed
c. Training				Extremely Very Somewhat Disappointed
d. Information about markets or prices				Extremely Very Somewhat Disappointed
e. Other				Extremely Very Somewhat Disappointed
f. Other				Extremely Very Somewhat Disappointed
g. Other				Extremely Very Somewhat Disappointed

If no services were paid for, skip to Question 53.

51. If you purchased a service only once, please describe why you did not purchase it again. (*circle all that apply*)

- a. The service no longer suited my needs
- b. Further services were not available in my area
- c. I found something similar elsewhere
- d. The services no longer benefited me
- e. I don't need it any more
- f. Other: Explain: _____

If no training was received, skip to Question 53.

52. What are the top three most useful skills that you gained from training related to business management practices? (*circle all that apply and write 1, 2 or 3 next to the most important*)

- a. ___ things related to customer care
- b. ___ differences in products/services offered
- c. ___ differences in relations with suppliers
- d. ___ record keeping
- e. ___ business planning
- f. ___ marketing (advertising and promotion)
- g. ___ assistance in coordinating supplies with sales
- h. ___ technical skills on use of inputs
- i. ___ demonstration plot management
- j. ___ other: _____
- k. ___ other: _____

53. Where do you buy the inputs and supplies that you sell?

Please describe: _____

54. How satisfied are you with the quality, availability, and access to these inputs and supplies?

	Products and Services	Level of satisfaction
a.	Quality of the inputs you want to buy	Extremely Very Somewhat Disappointed
b.	Availability of the inputs you want to buy	Extremely Very Somewhat Disappointed
c.	Ease of access to the inputs you want to buy	Extremely Very Somewhat Disappointed

Please explain: _____

55. If you changed the source for you inputs, could you please tell us why you changed? Please explain: _____

56. Have you received informal credit (such as postponed payments) directly from a large-scale input distributor, wholesaler or seed company that you buy inputs from?

a. Yes/No (circle one)

If yes:

b. When?: From _____ (year)

c. to _____ (year)

d. How many times did you get credit? _____

e. How much credit did you get? _____

f. For how long did you get credit? _____

g. From what institutions, organizations or individuals?

h. In general, how satisfied were you with the informal credit you got? (Extremely/ Very/ Somewhat/ Disappointed) [circle one]

57. Have you received formal credit directly from a large-scale input distributor, wholesaler or seed company that you buy inputs from?

a. Yes/No (circle one)

If yes:

b. When?: From _____ (year)

c. to _____ (year)

d. About how many times did you get credit? _____

e. About how much credit did you get? _____

f. How satisfied were you with the experience? (Extremely/ Very/ Somewhat/ Disappointed) [circle one]

58. Are you a member of a credit guarantee association supported by the AT-Uganda project?

a. Yes/No

If yes:

b. When?: From _____ (year)

c. to _____ (year)

d. How many times did you get credit? _____

e. How much credit did you get? _____

f. How satisfied were you with the experience? (Extremely/ Very/ Somewhat/ Disappointed) [circle one]

If they answered yes to both # 57 and # 58, go to #59. If not, skip to #60

59. Did the different types of credit from different sources affect your business differently ?

a. No/Yes (circle one)

b. If yes, how? _____

60. What difference did having the credit make to your business? _____

61. What prevents your business from growing faster or being more profitable? (please probe, but don't read the list) (circle all that apply) (circle all that apply and write 1, 2 or 3 next to the 3 most important)

a. ___ Lack of access to credit, insurance or other financial service

b. ___ Lack of cash when I need it to purchase inputs

c. ___ Difficult to find high quality seeds and other inputs

d. ___ High quality seeds and other inputs are too expensive

e. ___ Difficult to get needed supplies

f. ___ Transportation difficulties

g. ___ Farmers don't have enough money to buy my products and services

h. ___ Low demand for services

i. ___ Need more business training

j. ___ Need more technical training

k. ___ Need other business services

l. ___ Not enough time/busy with other things

m. ___ Not enough skilled or semi-skilled people available to help

n. ___ Poor weather conditions

o. ___ Other (please specify): _____

Part IV: Household and Income Information

62. What percentage of your household income is provided by your input business?

a. 100%

b. 75%

c. 50%

d. 25%

e. Other Response: _____ (please write)

63. Over the past year, has this contribution to household income:

- a. Increased
- b. Decreased
- c. Stayed about the same

If it has increased or decreased, please explain why:

(write in answer – use the back of the page if necessary)

64. Including you, how many people in your household do work that contributes to the family income? _____

65. Not including your input business, what other sources of income do people in your household have from the work they do? *(circle all that apply)*

- a. Salaried work
- b. Profits from crop farming
- c. Profits from livestock
- d. Profits from trade or micro enterprise
- e. Wage labor
- f. Other labor income
- g. Barter/exchange value
- h. Other *[specify]* _____

66. What other sources of income do you have? *(circle all that apply)*

- a. Rents from property
- b. Remittances/gifts
- c. Pension
- d. Savings and monthly interest
- e. Other *[specify]* _____

Part V: Background Information

67. Gender: Male ___0___ Female: ___1___ *(circle one)*

68. Where do you live?

- a. Rural (not in trading center)
- b. Small town/trading centre
- c. Peri-Urban
- d. Urban

69. What is your marital status?

- a. Single
- b. Married
- c. Divorced/Separated
- d. Widowed

70. Do you have any household members living with you?

- a. If yes, how many? _____ *(if no, mark '0')*
- b. How many of these are children? _____

71. What is your education level?

- a. Illiterate
- b. Adult literacy classes
- c. Primary
- d. Secondary – O level (ordinary)
- e. Secondary – A level (advanced)
- f. Tertiary

72. What is your age? _____

Do you have any questions?

**Thank you for your time and patience with us.
The information you provided will be very helpful.**

ANNEX 2: STOCKIST QUESTIONNAIRE

Uganda **FARMER** Survey 2006

Introduction: Main Points

1. My name is _____
2. I am working for Weidemann Associates in the United States.
3. We spoke with you (or someone in your family) 3 years ago, and now we have come back to talk with you again to see how things have changed for you over the past 3 years.
4. Why we are doing this research:
 - This is a survey sponsored by Weidemann Associates in the United States.
 - It is an international study in 3 countries, (Azerbaijan, Uganda, and India)
 - With your cooperation, the results from this survey will help policy makers understand better what helps farmers make their businesses stronger, so that they can support their families and children.
 - We want to know more about what actually helps or hurts farmers like you to improve your livestock and animal products and increase profits.
 - The time and information that you provide us will be very helpful for people in many countries.
5. This will take about a half and hour
6. All the information that you share in this survey will be kept strictly confidential. (Explain confidentiality thoroughly)
 - Though we will be asking you for your name and address, this is only so that we can link the information you give us today with the information you gave us three years ago. This is only for our own records and will not be shared with anyone.
 - Your name will not be kept in the same place with the information you provide us today.
7. You do not have to talk with me, but your answers will be very helpful.
8. Do you have any questions?
8. Do you agree to be interviewed?
9. Thank you very much.

Name of Respondent: _____

Location: Mbale/ Masindi (circle one)

Village: _____

Sub-county: _____

Parish: _____

Interviewer initials: _____ Supervisor initials: _____ Location: Bus/Res Date of Interview: _____ Interview: Code: _____

FARMER

Part I: Farm Background Information

1. Total land owned: _____ (acres)
2. Total land rented: _____ (acres)
3. Total land under cultivation: _____ (acres)
4. Total grazing land: _____ (acres)
5. How many people worked on your farm (include farmer)
 - a. during the past year? _____
 - b. 4 years ago? _____

6. Employment status of each person this year:

	Full time		Part time/seasonal	
	Male	Female	Male	Female
Paid				
Unpaid/labor exchange				
Family adults				
Family children				
Other				

7. List the crops you produced over the last two seasons:

Crops	Unit of Measure	Last Season 2005								First season 2006								
		Area Covered	Total pdn	Qty eaten	Qty for seed	Qty bartered or given	Qty sold	Where sold (use code)	Unit price	Area Covered	Total pdn	Qty eaten	Qty for seed	Qty bartered or given	Qty sold	Where sold (use code)	Unit price	
a.																		
b.																		
c.																		
d.																		
e.																		
f.																		
g.																		
h.																		
i.																		
j.																		
k.																		
l.																		

Codes: (1 = stockists, 2=market, 3= shop, 4=other farmer, 5=intermediates 6=other [specify]) Include all that apply.

Interviewer initials: ___ Supervisor initials: ___ Location: Bus/Res Date of Interview: _____ Interview: Code: _____

FARMER

8. List the livestock you have had over the last twelve months, last year and 4 years ago [fill in the table below]

Livestock	Now (this year)			Last year (2005)			4 years ago (2002)		
	No have	No sold	Ave price	No had	No sold	Ave price	No had	No sold	Ave price
Cattle									
Sheep									
Goats									
Pigs									
Poultry									
Other									

9. Please tell us about the milk, eggs, meat and other livestock products that you produced, consumed, and sold or bartered in the last 12 months.

10. For each of these products, when you compare the amount that you sold this year to the amount that you consumed 4 years ago. would you say that you consumed, much more, a little bit not, about the same, a little bit less, or much less? (circle one)

(include units)	This year (past 12 month)				Amount produced compared to 4 yrs ago
	Qty eaten	Qty sold or bartered	Total productn	Price	
Milk					Much more Somewhat more About the same Somewhat less Much less
Eggs					Much more Somewhat more About the same Somewhat less Much less
Meat					Much more Somewhat more About the same Somewhat less Much less
Other					Much more Somewhat more About the same Somewhat less Much less

11. Could you please estimate the percent *where* you sell or trade in-kind your livestock and animal products? (write a %: must sum to 100):

- a. _____% Own and/or surrounding village inhabitants
- b. _____% Intermediates (at your farm)
- c. _____% Intermediates (at local trading center)
- d. _____% Market in Mbale of Masindi
- e. _____% Processing enterprises
- f. _____% Stores, restaurants, or butchers
- g. _____% Other (*specify*) _____

12. Have you changed where you sell your products in the last year?

- a. Yes
- b. No
- c. If yes, how did you find out about the new places to sell?

The following questions are to be used to fill in the table on the next page:

To help me understand your business costs, for each input you mentioned I would like to know how much you used *OVER THE LAST TWO SEASONS* and how much it cost?

13. Besides labor, what other inputs do you use for your crops/livestock?

For each input:

14. How many different types or varieties of this did you buy?

15. How much did you buy? [note units]

16. How much did it cost?

17. Where did you get or buy it? [use source codes] [if procured or bought from more than one source, include all.] Write the name and location of the stockist(s), shop(s) or market(s) or the name of the NGO(s)

Interviewer initials: ___ Supervisor initials: ___ Location: Bus/Res Date of Interview: _____ Interview: Code: _____

FARMER

		Last 2 Seasons						4 Years Ago (2003)					
Products/Services		1 st season 2006			2 nd season 2005			1 st season 2003			2 nd season 2003		
Write name of stockist, shop(s), market(s) or NGO(s)]		Qty (note units)	Unit Cost Price	Sources (see codes below)	Qty (note units)	Unit Cost Price	Sources (see codes below)	Qty used (note units)	Unit Cost Price	Sources (see codes below)	Unit Cost Price	Qty used (note units)	Sources (see codes below)
a	Seed/ planting materials (specify)												
b													
c													
d													
e													
f													
g													
h													
i													
j													
k													
l													
m													
n													
o													
p	Fertilizers												
q	Fertilizers												
r	Pesticides/ Insecticides/Fungicides												
s	Herbicides												
t	Drugs for livestock												
u	Drugs for livestock												
t	Feed for livestock												
v	Buy Tools (e.g., pangas, axes, sprayers)												
w	Rent Tractor												
x	Rent Oxen												
y	Rent Spray Pump												
z	Rent Other: --												
aa	Services from an organization												
bb	Extension Services or training (specify)												
cc	Formal Credit												
dd	Postponed payment for input												
ee	Other: [specify]												
ff	Other: [specify]												

Codes: (1 = stockists [specify name(s) of stockist(s)], 2=market, 3= shop, 4=other farmer, 5=own seed/family, 6=NGO [specify], 7=other [specify])

Write name of stockist, shop(s), market(s) or NGO(s)]

Interviewer initials: ___ Supervisor initials: ___ Location: Bus/Res Date of Interview: _____ Interview: Code: _____

FARMER

18. Other sources of costs incurred for crop/livestock production during the last 2 seasons: (If mentioned in table on previous page, do not include here)

	Products/Services	Amount spent
a.	Land rent	
b.	Equipment rent (e.g.,oxen)	
c.	Sacks	
d.	Loan Payment/interest	
e.	Utilities/telephone	
f.	Fuel/transportation costs	
g.	Animal health services	
h.	Other[specify]	
i.	Other[specify]	

19. If you changed the number or types of inputs in the last 4 years, could you please tell us why you made those changes?

Please explain: _____

20. Please think about the money that you made selling your **CROPS** during the first season this year and compare it to the first season last year. Do you think that during the first season this year you earned:

- a. Much more
- b. A little more
- c. About the same
- d. A little less
- e. Much less

If different, please explain why: _____

21. Please think about the money that you made selling your **CROPS** during the first season and compare it to the first season 4 years ago. Do you think that during the first season this year you earned:

- a. Much more
- b. A little more
- c. About the same
- d. A little less
- e. Much less

If different, please explain why: _____

22. Please think about the money that you made selling your **ANIMAL PRODUCTS** (meat, milk, eggs, etc.) during the first season this year and compare it to the first season last year. Do you think that during the first season this year you earned:

- a. Much more
- b. A little more
- c. About the same
- d. A little less
- e. Much less

If different, please explain why: _____

23. Please think about the money that you made selling your **ANIMAL PRODUCTS** (meat, milk, eggs, etc. during the first season and compare it to the first season 4 years ago. Do you think that during the first season this year you earned:

- a. Much more
- b. A little more
- c. About the same
- d. A little less
- e. Much less

If different, please explain why: _____

Interviewer initials: ___ Supervisor initials: ___ Location: Bus/Res Date of Interview: _____ Interview: Code: _____

FARMER

24. Please think about the money that you made selling your **LIVESTOCK** during the **first season** and compare it to the first season **last year**. Do you think that during the first season this year you earned:

- a. Much more
- b. A little more
- c. About the same
- d. A little less
- e. Much less

If different, please explain why: _____

25. Please think about the money that you made selling your **LIVESTOCK** during the first season and compare it to the first season **4 years ago**. Do you think that during most recent first season this year you earned:

- a. Much more
- b. A little more
- c. About the same
- d. A little less
- e. Much less

If different, please explain why: _____

26. In the last year, have you received any type of credit, delayed payment for inputs, or other assistance with paying for the inputs you bought?

	Type of Payment Assistance	Sources (Use all codes below that apply & write names)	For how much? (shillings)
a.	Credit (delayed payment) on inputs from stockists/suppliers		
b.	Credit through a NGO/agency (e.g., voucher)		
c.	Credit (loan)		
d.	Other (specify)		

Codes: (1 = stockists [specify name(s) of stockist(s)], 2=market, 3=shop, 4=other farmer, 5=own seed/family, 6=NGO [specify], 7=other [specify])

27. You have mentioned before that you purchased inputs. Have you changed from where you purchased inputs in the past 4 years?

- f. Yes/No (circle one)

28. If yes, what were the reasons for changing outlets (source)? (circle all that apply)

- a. I was not satisfied with the quality of product
- b. I was not satisfied with quantity of product available
- c. Timing of access was not good
- d. Adulterated Inputs (e.g., fake seed)
- e. Location too distant
- f. Services offered did not benefit me
- g. Products were too expensive
- h. Other (specify) _____

29. Do you get all of your purchased inputs from the same person/business?

- i. Yes
- j. No

Why? _____

30. Have you changed the amount of inputs that you bought this year compared to last year?

- a. I bought more
- b. I bought about the same
- c. I bought less

If bought more or less, please explain why: _____

31. Would you have wanted to use more purchased inputs for your crops and livestock?

- d. Yes
- e. No

32. If yes, what are the limitations that keep you from purchasing more inputs for your crops and livestock? (do not read.- circle all that apply)

- a. I am not satisfied with the quality of the inputs
- b. There were no inputs available when I wanted to buy them
- c. I don't have enough cash/money when the inputs are needed
- d. I can't afford it (don't ever have enough cash/money)
- e. I don't need purchased inputs
- f. The stockist (or other place to purchase inputs) is too far away
- g. Other: _____

Please Explain: _____

Interviewer initials: ___ Supervisor initials: ___ Location: Bus/Res Date of Interview: _____ Interview: Code: _____

FARMER

Please fill in the following table based on the questions below. Please write the name of the source(s) that provided each service. If training is mentioned, list practices and techniques they learned (please probe)

I'd like to talk about services that you may have received in the LAST 12 MONTHS.

- What types of services related to your farm have you received?
- How much did these cost?
- How many times did you buy or receive this?
- How would you rate your level of satisfaction with each service you obtained? (*circle one in the table below*)

33. Have you ever visited a demonstration plot that showed the effects of using purchased agricultural inputs? (*Fill in a. below*)

34. What types of services have you received from the outlet (source) where you purchase inputs or from other players? (*please probe & fill in b. through i. below*)

	Products/Services	How much did it cost? (2)	How many times? In the last year (3)	Sources (Use all codes below that apply & write names) (4)	Level of satisfaction (5)
a.	Demonstration plot				Extremely Very Somewhat Disappointed
b.	Advice/training about input use				Extremely Very Somewhat Disappointed
c.	Formal training (describe)				Extremely Very Somewhat Disappointed
d.	Discount price for inputs				Extremely Very Somewhat Disappointed
e.	Information about crop/livestock prices				Extremely Very Somewhat Disappointed
f.	Information about places/markets				Extremely Very

	where to sell produce/livestock				Somewhat Disappointed
g.	Purchased my products				Extremely Very Somewhat Disappointed
h.	Other [specify]				Extremely Very Somewhat Disappointed
i.	Other [specify]				Extremely Very Somewhat Disappointed

Codes: (1 = stockists [*specify name(s) of stockist(s)*], 2=market, 3=shop, 4=other farmer, 5=own seed/family, 6=NGO [*specify*], 7=other [*specify*])

35. If they mentioned services in the table above: **How has the availability of these services affected you?** _____

36. If advice/training is mentioned, which three skills have been the most important ones that you used or applied on your farm? (*Please mark 1, 2, or 3 next to the 3 choices.*)

- a. ___ things related to crop protection (insecticide/pesticide use)
- b. ___ things related to crop production (seed varieties only)
- c. ___ things related to livestock health (injections & animal care)
- d. ___ spacing to increase yield
- e. ___ planting in rows / lines
- f. ___ soil fertility management
- g. ___ storage techniques
- h. ___ processing (e.g., cakes, oils)
- i. ___ Other: _____
- j. ___ Other: _____
- k. ___ Other: _____

37. In your opinion, how difficult is it to find a buyer for your products?

- a. Impossible
- b. Very difficult
- c. Somewhat difficult
- d. Easy
- e. Very easy

Interviewer initials: _____ Supervisor initials: _____ Location: Bus/Res Date of Interview: _____ Interview: Code: _____

FARMER

Explain: _____

38. Do you belong to a farmer or livestock raisers organization?

Yes/No (circle one)

39. Do you participate in any project or receive any free services from any NGO/organization

Yes/No (circle one)

40. Have you ever heard or seen any advertising or marketing for agricultural inputs? (mark an "x" for all that apply on the next table)

41. For those that they mention: Did this influence your decision to purchase a type of input that you didn't purchase before or to purchase more of an input than you did before? (mark an "x" in the next table)

	Products/Services	Seen/ heard this (41)	Influenced purchase (42)
a.	On the radio		
b.	In the newspaper		
c.	In flyers/brochures leaflets		
d.	On a sign by the road		
e.	On a sign in a shop		
f.	Other [specify]		
g.	Other [specify]		

42. What are the limitations that keep you from being able to increase your income from your farm?

- a. Lack of cash/money/credit to invest
- b. Difficulty of transportation to market
- c. Don't know enough about market prices
- d. Don't know how to improve production
- e. Don't have time
- f. Vermin attack/eat my crops [specify] _____
- g. Other _____
- h. Other _____

Part II: Household and Income Information

43. Including you, does anyone in your house work elsewhere – off-farm? If yes, How many? _____

44. What other kind of work are you and/or others involved in? (circle all that apply)

- a. Salaried
- b. Wage labor
- c. Other labor income
- d. Trade/micro enterprise
- e. Barter/exchange value
- f. Other [specify] _____

45. What other sources of income do you have? (circle all that apply)

- a. Rents from property
- b. Remittances/gifts
- c. Pension
- d. Savings and monthly interest
- e. Other [specify] _____

Part III: Background Information

46. Gender: Male 0 Female: 1 (circle one)

47. Where do you live?

- a. Rural (not in trading center)
- b. Small town/trading centre
- c. Peri-Urban

48. What is your marital status?

- a. Single
- b. Married
- c. Divorced/Separated
- d. Widowed

49. Do you have any household members living with you?

- a. If yes, how many? _____ (if no, mark '0')
- b. How many of these are children? _____

50. What is your education level?

- a. Illiterate
- b. Adult literacy classes
- c. Primary
- d. Secondary – O level (ordinary)
- e. Secondary – A level (advanced)
- f. Tertiary

51. What is your age? _____

Do you have any questions?

**Thank you for your time and patience with us.
 The information you provided will be very helpful**

ANNEX 3: LARGE-SCALE DISTRIBUTOR, WHOLESALER OR SEED PRODUCER QUESTIONNAIRE

Uganda LARGE-SCALE DISTRIBUTOR/ETC. Survey 2006

Introduction: Main Points

1. My name is _____
2. I am working for Weidemann Associates in the United States.
3. Why we are doing this research:
 - This is a survey sponsored by Weidemann Associates in the United States.
 - It is an international study in 3 countries, (Azerbaijan, Uganda, and India)
 - We want to know more about what actually helps or hurts business owners, like you, to sell your provide services to farmers/retailers/customers, expand what you offer and increase your profits.
 - With your cooperation, the results from this survey will help policy makers understand better what helps farmers and stockists make their businesses stronger.
 - We want to know more about what actually helps or hurts farmers like you to improve your livestock and animal products and increase profits.
 - The time and information that you provide us will be very helpful for people in many countries.
5. This will take about a half and hour.
6. All the information that you share in this survey will be kept strictly confidential. (Explain confidentiality thoroughly)
 - We are talking to you today because we talked to you (*OR a colleague of yours*) three years ago. We will be asking you for your name, only so that we can link the information you give us today with the information from three years ago. This is only for our own records and will not be shared with anyone.
 - Your name will not be kept in the same place with the information you provide us today.
7. You do not have to talk with me, but your answers will be very helpful.
8. Do you have any questions?
8. Do you agree to be interviewed?
9. Thank you very much.

Location Mbale/Kampala/Masindi Village: _____

Name of Respondent: _____

Name of Business: _____

Business Address: _____

1. What is your primary business activity?
 - a. Seed production
 - b. Wholesale input supplier
 - c. Input distributor
2. What other activities does your business have? *(circle all that apply)*
 - a. Seed production
 - b. Wholesale input supplier
 - c. Input distributor
 - d. Breeding
 - e. Seed germination
 - f. Experiments
 - g. Other *(specify)*: _____
3. For how long has this business been in operation? _____ (years)
4. How many employees work for here (include owner) _____?
5. Employment status of each person:

	Full time		Part time/seasonal	
	Male	Female	Male	Female
Paid				
Unpaid				
Trainee				
Family/other				
Totals				

6. How many outgrowers does this business have? _____
7. How many outlets or alternative distribution locations does this business have this season? _____
8. What about distribution locations last season? _____
9. How many distribution locations did you have 3 years ago in 2003?

10. Please list all the agricultural *products* your business sells to stockists/retailers/farmers: *(circle all that apply)*
 - a. Seeds
 - b. Fertilizers
 - c. Pesticides
 - d. Herbicides/ Insecticides
 - e. Small tools (i.e. wheel barrows, pangas, axes, sprayers)
 - f. Equipment rental (e.g., tractor services, sprayers, etc.)
 - g. Other: _____

Use the following 2 questions to fill in the table below.

11. Please list all the agricultural *services* your business offers to stockists/retailers/farmers: *(mark “x” for all that apply)*
12. Do you offer any free products/services to customers? *(mark “x” for all that apply)*

	Services	Offered	Free
a	Training through a demonstration plot		
b	Formal training classes for stockists <i>[specify topics]</i>		
c	Printed information about using inputs (seed variety, applying chemicals)		
d	Advice (verbal) about using inputs (seed variety, applying chemicals)		
e	Information about market prices for sale of farm products (crops and animals)		
f	Information about other places/markets to sell produce and livestock		
g	Discount/sale prices		
h	Subsidized price for inputs		
i	Credit Sales (for trusted customers)		
j	Promotion for new products, equipment or training		
k	Advertising (radio, newspaper, leaflets, etc.)		
l	Other _____		
m	Other _____		

Use the following 2 questions to fill in the table below.

13. What are your sales for the 12 months from November 2005 to October 2006 (end of last season in 2005, first season this year and estimation through October)?

14. What were your sales for the same time period 3 years ago?

Month	Nov. 2005-Oct. 2006 Sales	Nov. 2002-Oct. 2003 Sales
November		
December		
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
First Season Total		
12 month Total		

15. What type of customers do you service directly? (mark all that apply)

- a. peri-urban retailers/stockists
- b. rural retailers/stockists
- c. urban retailers/stockists
- d. stockists connected to farmer's groups
- e. commercial farmers
- f. small farmers
- g. NGOs
- h. Groups connected to International Agencies
- i. people in neighborhood
- j. no direct services to retailers/stockists

16. What is your best estimate of your customer base (mark a percentage and it must sum to 100):

- a. ____% peri-urban retailers/stockists
- b. ____% rural retailers/stockists
- c. ____% urban retailers/stockists
- d. ____% retailers connected to farmer's groups
- e. ____% commercial farmers
- f. ____% small farmers
- g. ____% NGOs
- h. ____% Groups connected to International Agencies

17. Have you accessed ANY services with an organization or project? If yes, explain with whom, what services (credit, training, grant, interns/apprentices) and how much did they cost (if at all):

Service	From Whom	Cost
Training for Staff		
Grants		
Credit		
Training for Stockists		
Special links to stockists		
Other (specify)		
Other (specify)		

18. In your opinion, how difficult is it to service your customers during peak times (i.e., planting, rains)?

- a. Impossible
- b. Very difficult
- c. Somewhat difficult
- d. Fairly easy

Explain: _____

19. Describe any problems you have with distributing your goods: _____

20. Describe any problems you have with doing business: _____

**Do you have any questions?
Thank you for your time and patience with us.**

Village: _____ Parish: _____ Sub-county: _____ Date of Interview: _____
Interviewer Initials: _____ Experimental /Control _____ Supervisor's Initials: _____

ANNEX 4: IN-DEPTH INTERVIEW GUIDE: STOCKIST (SHOP OWNER)

The following is the text of the In-depth Interview Guide.

The introduction used was the same as the introduction for the quantitative survey questionnaires.

Date:

Village:

1. Please tell me about your business experience.
 - a. How long have you been in business?
 - b. Number of employees now and 3 years ago
 - c. Do you do anything to motivate farmers to purchase inputs from you?
 - i. What do you do?
 - ii. What impacts has it had?
2. How has your business changed in the last four years?
 - a. Sales increased or decreased? (why? Probe for farmer interest, weather, economy, etc.)
 - b. Costs increased or decreased? (why?)
 - c. Profits increased or decreased? (why?)
 - d. How has your customer base changed? (why?)
 - e. Have you changed the variety of products and services you offer? (How and why?)
3. Have you received any training to help you with your business? Could you please tell me about it?
 - a. Who did you get training from?
 - b. What kinds of training did you receive?
 - c. What were the most useful things that you learned in the training?
 - d. Were you able to put those things into practice? Why and/or why not?
 - e. What do you do differently?
 - f. What impacts has it had?
4. Have you received any other kinds of support that have helped you with your business? (such as credit, advice, subsidized prices for purchases, help with advertising, etc.)? Please tell me about them.
 - a. What kinds of support did you receive?
 - b. Who did you get the support from?
 - c. What were the most useful types of support that you received?
 - d. How did these help you improve your business?
5. Have you done any advertising in the last 3 years?
 - a. Why – or why not?If yes:
 - b. Please tell me about your experiences with advertising.
 - c. How easy or hard was it to do the advertising?
 - d. Do you think that the advertising changed your business? How? Please explain - brought you more customers? Increased your profits?
 - e. Do farmers seem to appreciate your advertising?
6. What are the main constraints that keep you from selling more inputs? (*probe for credit, farmer interest in purchasing inputs, etc.*)

Village: _____ **Parish:** _____ **Sub-county:** _____ **Date of Interview:** _____
Interviewer Initials: _____ **Experimental /Control** _____ **Supervisor's Initials:** _____

7. What are the main other types of constraints that your business faces?
8. In the past three years, has it become easier or less easy to purchase the inputs that you sell? Why?
9. Do you have access to any kind of credit for your purchases?
 - a. From whom?
 - b. How does it work? (directly from distributor? Through UNADA/credit guarantee association?)
 - c. Has this changed in the last 4 years? - If so:
 - i. please explain
 - ii. What impact does this have on your business?
10. Do you participate in UNADA or AT Uganda activities? (Please explain)
 - a. How has your participation changed over the last 4 years? (increases and decreases and reasons for the changes)
 - b. Have you changed anything about your business since starting to participate in UNADA or AT Uganda project activities?
 - c. If so, what are the positive and negative impacts you have seen? (*be sure to probe for both positive and negative*)
11. How old are you?
12. What is your education level?
13. Male or Female.

Do you have any questions?

**Thank you for your time and patience with us.
The information you provided us will be very helpful.**

Village: _____ Parish: _____ Sub-county: _____ Date of Interview: _____
Interviewer Initials: _____ Experimental/Control _____ Supervisor's Initials: _____

ANNEX 5: IN-DEPTH INTERVIEW GUIDE: FARMER

The following is the text of the In-depth Interview Guide.

The introduction used was the same as the introduction for the quantitative survey questionnaires.

1. **Mbale or Masindi**
2. **Participant or Control**
3. **Peri-Urban or Rural/remote**
4. **Man or Woman**
5. What types of inputs do you buy for your farm?
6. During the last 3 years, have you changed the types of inputs or the amount of inputs that you buy from a stockist? (increased or decreased, changed types inputs, etc.) If so, why?
7. Do you buy all of the inputs that you use for your farm from the same person, shop or stockist? Or do you buy some things from one person and other things from another person?
 - a. If more than one source of inputs, why?
8. If you purchase inputs from a stockist, do you always purchase them from the same stockist? Or do you buy some things from one stockist and other things from another stockist?
 - a. If more than one stockist, why?
9. Have you changed the main stockist you shop with in the last 3 years?
 - a. If so, Why?
10. Does the stockist you buy inputs from provide information or advice on the improvement of crop productivity? (describe)
11. Are you satisfied with the information from the stockist on the improvement of productivity of your crops?
12. Does the stockist you purchase inputs from offer you credit? If so, how does that affect your input purchase decisions? (purchase more, less, different types of inputs, etc.)
13. What other kinds of things beside the inputs that you purchase do you get from the stockist? (market information, etc.)
14. Where do you get information on markets and current prices?
15. Have you seen or heard any advertising about buying inputs?
 - a. If so, has the advertising had any effect on how you think about your farming? (please describe)
 - b. Has the advertising had any effect on what kind of inputs or how much inputs you purchase? Please explain.
16. Do you buy most of the inputs yourself for your farm or is your wife/husband/son/daughter/other the person who purchases most of them?
17. Have your crops yields increased or decreased over the last 3 years?
 - a. If so, why did they increase?
 - b. If they decreased, why did they decrease?
18. Do you think that you are making a better living from you farm now than you did 3 years ago?

Village: _____ Parish: _____ Sub-county: _____ Date of Interview: _____
Interviewer Initials: _____ Experimental /Control _____ Supervisor's Initials: _____

19. If you are interested in improving the productivity of your crops or your income from farming, what are the main limitations that make it difficult for you?
20. What would motivate you to purchase more inputs?
21. Would you like to purchase more inputs? If so, what keeps you from doing so?
22. Do you have any advice to the stockist that may help him or her improve their business to provide better support to you?
23. Total land owned: _____(acres)
24. Total land rented: _____(acres)
25. Total land under cultivation: _____(acres)
26. Total grazing land: _____(acres)
27. Do you own any cows? If so, how many?
28. What is your marital status?
 - a. Single
 - b. Married
 - c. Divorced/Separated
 - d. Widowed
29. Do you have any household members living with you?
 - a. If yes, how many? _____ (if no, mark '0')
 - b. How many of these are children? _____
30. What is your education level?
 - a. Illiterate
 - b. Adult literacy classes
 - c. Primary
 - d. Secondary – O level (ordinary)
 - e. Secondary – A level (advanced)
 - f. Tertiary
31. What is your age? _____

Do you have any questions?

**Thank you for your time and patience with us.
The information you provided us will be very helpful.**

Village: _____ Parish: _____ Sub-county: _____ Date of Focus Group: _____
Facilitator Initials: _____ Note Taker Initials: _____ Experimental/Control Supervisor's Initials: _____

ANNEX 6: FOCUS GROUP DISCUSSION GUIDE: FARMERS: MEN

*The following is the text of the Focus Group Discussion Guide.
The introduction used was the same as the introduction for the quantitative survey questionnaires.*

1. **Date:**
2. **Mbale/Masindi** (circle one)
1. **Participant or Control** (circle one)
3. **Peri-Urban or Remote/Rural** (circle one)
4. **Small or Large Farmers** (circle one)
5. **Village:**
6. **Parish:**
7. **Sub-county:**
8. **Focus Group Facilitator:**
9. **Note taker:**

10. **Number of Participants:**
11. **Brief Characterization of Participants:**

12. What are the main crops that you grow?
13. What are the main animals that you raise?
14. Does most of your farm income come from crops or from animals?
15. What types of inputs do you buy for your farm?
16. What changes have you noticed or observed over the last year/season regarding the amount of inputs you use?
 - a. What about in terms of the kind of inputs you use? [*Probe: quality*]
 - b. Why have these changed?
17. Does the stockist you buy inputs from provide information or advice on the improvement of crop productivity? (describe)
18. Does the stockist you purchase inputs from offer you credit? If so, how does that affect your input purchase decisions? (*purchase more, less, different types of inputs, etc.*)
19. Have you seen or heard any advertising about buying inputs?
 - a. If so, has the advertising had any effect on how you think about your farming? (*please describe*)
 - b. Has the advertising had any effect on what kind of inputs or how much inputs you purchase? (*Please explain*)
20. What other additional services or supports are available to farmers to increase their production?
 - a. Have any of you ever accessed these services/goods?
 - b. If so, what are they?
 - c. Did you have to pay for them?
21. Have your crops yields increased or decreased over the last 3 years?
 - a. If so, why did they increase?
 - b. If they decreased, why did they decrease?

Village: _____ **Parish:** _____ **Sub-county:** _____ **Date of Focus Group:** _____
Facilitator Initials: _____ **Note Taker Initials:** _____ **Experimental/Control Supervisor's Initials:** _____

22. Do you think that you are making a better living from your farm now than you did 3 years ago?
 - a. Why?
23. If you are interested in improving the productivity of your crops or your income from farming, what are the main limitations that make it difficult for you?
24. If you would like to purchase more inputs, what keeps you from doing so?
25. Do you have any advice to stockists that may help them improve their business to provide better support to you?
26. Is there else you would like to tell us?

Do you have any questions?

**Thank you for your time and patience with us.
The information you provided us will be very helpful.**