

Assessing the Impacts of Shamba Shape Up

A report commissioned by AECF and led by University of
Reading

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Executive summary

1. AECF commissioned a study to investigate the impact of the Shamba Shape Up TV edutainment programme on small-scale agriculture in Kenya and to research the processes by which the programme influences farmers' activities
2. The assessment is based on a theory of change that draws on three bodies of theory and research which have informed the design of the Shamba Shape Up initiative: mass media and society; agricultural and rural extension; and innovation systems
3. The study focused on the area of Kenya that Shamba Shape Up is targeted at and the rigorous statistical design of the assessment allows robust estimates of the size of the audience, and of the effects of Shamba Shape Up at farm and population levels
4. Two questionnaire surveys were conducted across 119 Enumeration Areas together with a more detailed study at selected locations using participatory tools
5. In the 26 rural and peri-urban counties which comprise the main target audience, Shamba Shape Up is viewed in 12.6% of sampled households
6. Most viewers report that the programme has helped them improve the profitability of their enterprises and has had a positive effect on their families' food situation
7. Shamba Shape Up covers a range of enterprises. This assessment focussed mainly on maize and dairy as they were the most focused on. In both enterprises, viewers of the programme were significantly more likely to have made changes in practice featured in broadcasts, and to have made more changes, than non-viewers, even when other socio-economic variables are taken into account
8. The overall number of households specifically reporting that they had made changes to their maize or dairy practices as a result of the programme, or who reported that they had benefited from SSU through increased profit or improved household food situation, is statistically estimated to be 428,566
9. Households who reported making specific changes in their farming practices as a result of Shamba Shape Up are statistically estimated to be 218,562 households for maize and 65,063 for dairy
10. From these two enterprises, the statistically estimated net economic impact in the 25 counties was US\$24,718,648; this comes mostly from dairy enterprises.
11. Viewers reported a range of effects of the programme, beyond the impact on output and profitability: these included improved food security and nutrition, confidence in their management ability, enhanced social status and the re-investment of increased income in other, off-farm, livelihood activities
12. Findings from detailed participatory budgets indicated that gross margins for maize and dairy have improved for viewers of the programme over the past two years, and to a greater extent than for non-viewer

13. There is some evidence that women dairy farmers who have made changes influenced by the programme have been able to reduce the gap in gross margins between them and male dairy farmers
14. Trust in a source of information and influence has a significant effect on the likelihood that farmers will make changes promoted or suggested by the source; Shamba Shape Up scores higher on trust than other more conventional sources of information among viewers of the programme
15. Most viewers identify with the problems farmers face in the broadcasts, care about the families shown and feel involved with them
16. Most viewers feel that they get useful information from the programme and that it helps them make decisions on their own farms; they learn things that they can try out; and they also find the broadcasts enjoyable to watch
17. The programme has become an important part of farmers' information and innovation systems, operating as a trusted source of information presented in a format that engages their interest and emotions, encourages discussion and provides opportunity for follow-up and interaction

1.0 Introduction and background

As a part of its mandate to monitor and evaluate the development programmes that it funds, the Africa Enterprise Challenge Fund (AECF) has partnered with Mediae Ltd, who have commissioned the University of Reading to assess the influence of the agricultural educational / entertainment television programme Shamba Shape Up.

Shamba Shape Up (SSU) is a makeover educational TV programme broadcast on Citizen Television, in Kenya in 39 weekly, 30 minute instalments throughout the main cropping season. Each episode is broadcast twice a week, once in Swahili (on Sunday afternoon) and once in English (on Saturday afternoon). Each weekly instalment consists of a visit to a selected farm (Shamba) where current issues and problems facing a host farmer and household are discussed. Solutions and opportunities are identified with the help of experts. Potential changes to the farm enterprises are explored through demonstration and explanation. In some cases, a contribution to the costs of making changes to effect solutions is paid by SSU.

Topics for discussion and demonstration in each episode are sponsored by a wide range of commercial, not-for-profit and public sponsors including Cooper Brands Ltd (suppliers of animal health and nutrition products), International Fund for Agricultural Development (IFAD), International Fertilizer Development Centre (IFDC), Alliance for a Green Revolution in Africa (AGRA), the Africa Soil Health Consortium, Syngenta (agro-chemicals) and Kenchic (poultry feeds). Sponsorship is recognised in the programme; sources of advice are mentioned and trade products and medicinal dosages or treatments are specified.

Each SSU instalment covers up to five topics broadly relevant to the stage of the cropping season when the broadcast takes place. The programme also broadcasts widely in Tanzania and less widely in Uganda and Rwanda.

Print and SMS (telephone text messaging) facilities accompany all programmes. Key programme messages are summarised and explained in leaflets and SMS systems have been set up to manage questions and requests for information. During every programme, audiences are invited to send an SMS if they would like a leaflet with more information on the topics covered, or if they wish to interact with the show on other matters. The use of SMS and social media in conjunction with SSU seems popular and, with rising access to the internet, social media such as Facebook and YouTube are being used to expand the two-way relationship with audiences. Over an 18-month span, Mediae has built a database of viewers who have interacted with SSU (mainly by requesting a copy of an SSU printed leaflet) which totals over 70,000 people, spread across all of Kenya's main agricultural areas.

1.1 Aims of the Research

While previous studies have been commissioned to investigate the influence of SSU, the reliability of empirical data is variable due to sample designs and sampling procedures,

which did not allow selection bias to be estimated. As such, the extent of influence of SSU and SSU demonstrated practices has not yet been fully investigated.

To appropriately understand and measure impact of SSU it is important to understand how many smallholder farmers are being reached by SSU, the extent to which those farmers are making changes to their farm enterprises as a result of watching the programme, the processes involved in changing farmers' behaviour and whether these changes are leading to measurable social and economic gains for farmers and Kenyan agriculture more broadly. Specific objectives for the study are threefold:

- Identify the primary beneficiaries of the programme (including their poverty status),
- Measure the impact of the programme upon them, and
- Investigate the wider impacts on the information market systems as a result of the project.

To address a challenging research topic and time frame, the study sought to take a rigorous, realistic and transparent approach to answering the aims of this research. Specifically the following research questions were asked:

1. What is the impact of the programme?
 - a) How many farmers are being reached by SSU and who are these farmers?
 - b) What are the economic and social benefits gained by farmers as a result of viewing SSU?
2. What is the process by which SSU influences change? [*Testing Theory of Change*]
 - a) How is SSU influencing farmers' decision making and activities
 - b) What role does SSU play in farmers' innovation system?

1.2 The Research Team

The research was managed the University of Reading, who coordinated the implementation of research design and the subsequent data analysis and reporting. Kenyan research partners included Research Guide Africa (RGA), Adaptive Research Centre Africa (ARCA) and Howard and Crowe Consultants. The CDI group at Wageningen University provided oversight and quality assurance throughout the research process.

1.3 Dates of Study

Following the review of literature and development of a theory of change (ToC) a research design workshop was held in Nairobi between 3rd and 5th March 2014. Subsequently, piloting of both qualitative and quantitative methods took place prior to data collection between April 9th and May 24th 2014.

Preliminary results were presented to members of AECF, Mediae as well as other Kenyan agricultural and communication experts during a workshop in Nairobi on June 26, 2014.

2.0 Approach

The research took a systematic, detailed approach; using multiple methods.

2.1 Mixed Methods Approach Used

A mixed methods approach was used to answer the research questions and objectives that were set (see figure 2.1). These also enabled triangulation of findings. The research was initiated by a *Literature Review*, which detailed the development of the Theory of Change (ToC). A *Listing Survey* was then used to frame sampling and to quantify TV ownership and SSU viewership. This Listing Survey covered 119 Enumeration Areas (EAs) and 9,885 households. This was followed by the main survey which investigated in more detail the practices, attitudes, willingness to pay and effect on gross margins, covering a sample of 1,572 households. Running concurrently, the *Participatory Qualitative Research* (PQR) was conducted to investigate the effect of SSU on the social and economic circumstances of farmers and to understand the processes by which SSU influenced behaviours.

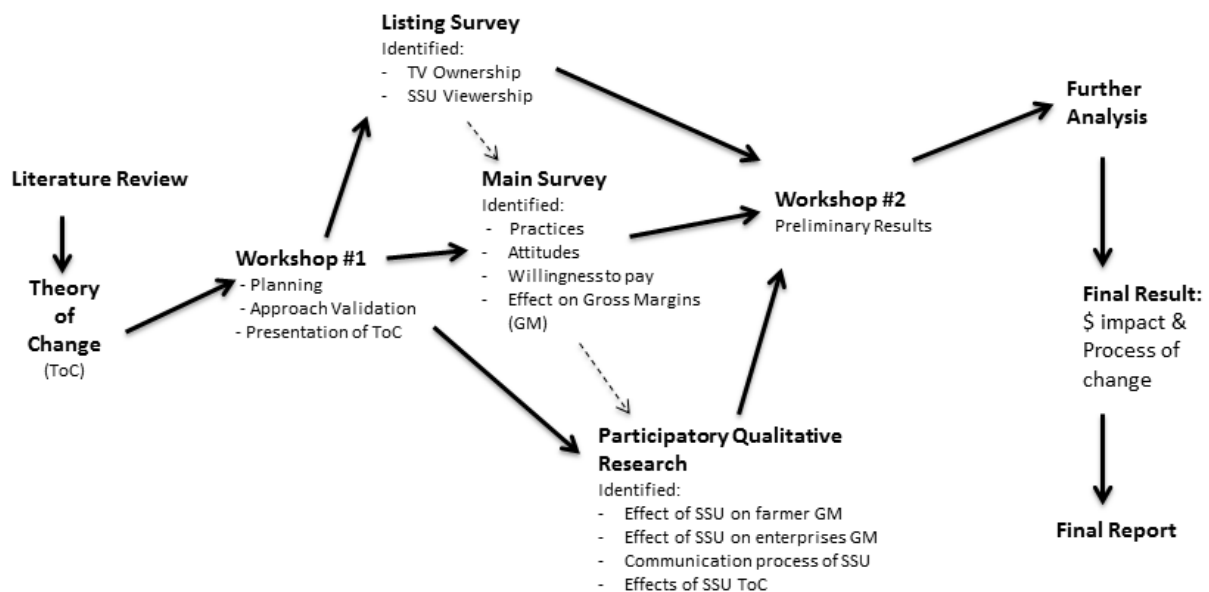


Figure 2.1: Flow chart showing the research process

2.2 Challenges in conducting impact studies

Investigations of impact normally have to take into account a range of methodological challenges such as determining attribution. In the case of studying SSU several issues posed challenges. There is no baseline information available for comparison of before and after any changes influenced by SSU. The study therefore compared those who made changes influenced by SSU with those who did not. The lack of a survey baseline and of basic information on access to TVs and numbers of people watching SSU in the population necessitated a thorough sampling / listing survey and from this sampling a second, more detailed, survey was made. The nature of this kind of 'after the event' impact study and the fact that record keeping is not widespread means that data collection has to rely upon farmer recall. Recall on farm production to a period before a farmer had started to use SSU

information in order to make comparisons with recent production was not considered to be viable both because of farmer recall and because differences between years in weather (and other factors such as market prices) are likely to have major influences on production, potentially greater than those of SSU. Further, many of the practices covered by SSU are generally known agricultural practices that have been used in Kenya for several years / decades. This means that attributing influence to a specific source is difficult. As discussed above, this research operated under a strict timeframe and, while the study area and sampling accomplished is extensive, the limited time available was a constraint.

2.3 Main Components of the Study

The main components of the study are introduced in this section and the timeline of activities is outlined in figure 2.2.

Activities	Feb	March	April	May	June	July	Aug	Sept
Literature Review								
Workshop 1 - Research Design								
Design/prep.								
Surveys								
PQR								
Data analysis								
Workshop 2 - Preliminary Results								
Final Data Analysis								
Reporting								
Final Report								

Figure 2.2: Study Gant chart

Literature Review

A *Literature Review* on television in agricultural and rural development was undertaken to focus specifically on research-based evidence of the ways in which rural populations 'consume' and interact with various formats of television programming, on the research designs and methods that have been used to study the effects and impact of television in rural settings and on substantive findings on effects and impact derived from these studies. The literature review was conducted to provide a synthesis of evidence on the use, formats, trends, effects and impact of television programming among rural populations.

Theory of Change

Theory of Change (ToC) represents a long evolution of the evaluation process that is meant not only to understand or predict outcomes, but also to understand the deeper meanings and reasons as to the 'whys' and 'hows' of specific actors, actions or interventions. SSU is a

departure from conventional 'farm broadcasting' in Kenya. The programme brings multiple experts to a farm household; a rare occurrence for the majority of Kenya's smallholder farmers; and the audience has an opportunity to share in the learning process of the host farm household. SSU represents social learning, which is an essential element in more interactive, participatory approaches to agricultural extension and innovation. Given SSU's unique approach, a theory of change was developed for the programme that captures the complex ways in which SSU might be expected to contribute to decision-making by farm households and the overlapping influences and impacts. The complete Literature Review and SSU Theory of Change can be reviewed in appendix B.

Listing Survey

The Listing survey was conducted with 9,885 households in 119 Enumeration Areas (EAs). The survey was necessary to accurately establish the level of TV ownership and SSU viewership in the designated study area, as there were previously no definitive figures on TV ownership or the number of people watching SSU in the area. This information was vital for the sampling procedure for the main survey which followed and to enable the statistical estimation of the impact that the programme is having.

Main survey

The Main survey was conducted with 1,572 households across the target areas of SSU viewership. The purpose of the survey was to understand the effect of SSU on farmer behaviours in rural and peri-urban areas as well as to establish the financial benefits of SSU on specific enterprises. The main survey results were weighted to account for sampling bias (see section 2.6).

Participatory Qualitative Research

The overall objective of the Participatory Qualitative Research (PQR) was to provide deeper insight into the development of SSU's Theory of Change as well as the role of SSU and TV more generally in Kenya. The PQR was used to understand the changes taking place on farms in the areas covered by SSU broadcasts and to put the specific practices covered by SSU broadcasts into an overall economic and agricultural development context. Participatory Budgets provided detailed quantification of inputs and outputs associated with SSU practices and enabled the comparison of performance with and without SSU practices.

Presentation of Preliminary Results

The preliminary results from the study were presented to AECF, Mediae as well as other Kenyan agricultural and communication specialists through a workshop in Kenya on June 26, 2014. This gave an opportunity for expert input into the on-going analysis.

2.4 Choice of Practices

SSU broadcasts have covered a broad range of agricultural enterprises and specific agricultural practices (see appendix G). Within the time and resource limitations of this research, only a specific selection of practices could be investigated. Three enterprises, maize, dairy and poultry (broiler), were chosen as they were considered to be enterprises on which SSU had focussed and within which the impact of the programme could be measured. Selection of the specific practices to be analysed was done through a systematic process, following criteria based on frequency of practice transmission as well as previous survey results. The final choice of enterprises was agreed with members of Mediae who had intimate knowledge of the programs. The process also benefited from consideration and discussion at the Research Design Workshop.

Following initial analysis it was clear that the number of poultry (broiler) farmers in the survey was too small to provide meaningful results when generalised across the sample. For this reason the research team decided to concentrate on maize and dairy enterprises (however, in the PQR 'local' forms of poultry production were subsequently explored). The practices that were identified for maize and dairy enterprises are shown in table 2.1.

Table 2.1: Specific agricultural practices promoted by SSU in maize and dairy enterprises

Maize Practices	Dairy Practices
Apply fertilizer at planting	Increase the size of your dairy herd
Apply fertilizer mixed with manure at planting	Plant Napier Grass for the first time
Apply manure at planting	Increase the area of Napier Grass
Purchase maize seed from a agro-dealer/shop	Feed cows using chopped Napier Grass
Plant a crop in your maize plot as an intercrop	Spray dairy cows for ticks or lice
Purchased packed seeds for intercropping from a shop/agro dealer	Deworm your dairy cows
Planted your maize at this distance 2.5 feet/75cm between rows and 1 foot/30cm between plants	Treat for mastitis
Apply top dressing fertilizer	Make and feed hay
Weed your maize two times (or more)	Make and feed silage
Planted Desmodium in the maize field	Purchase supplement feeds or salt licks
Use Actellic in your stored maize	Ensure cows have enough water all day
Test the soil in your farm	Since March 2012 Construct a new dairy shed with a floor, easy to clean, has dry space for the cow and is protected against wind
	Since March 2012 Make improvements to your dairy cow shed so that it is easy to clean, has dry space for the cow and is protected against wind

2.5 Study Target Area

The main areas in Kenya that SSU is targeted at were identified in consultation with Mediae (figure 2.3).

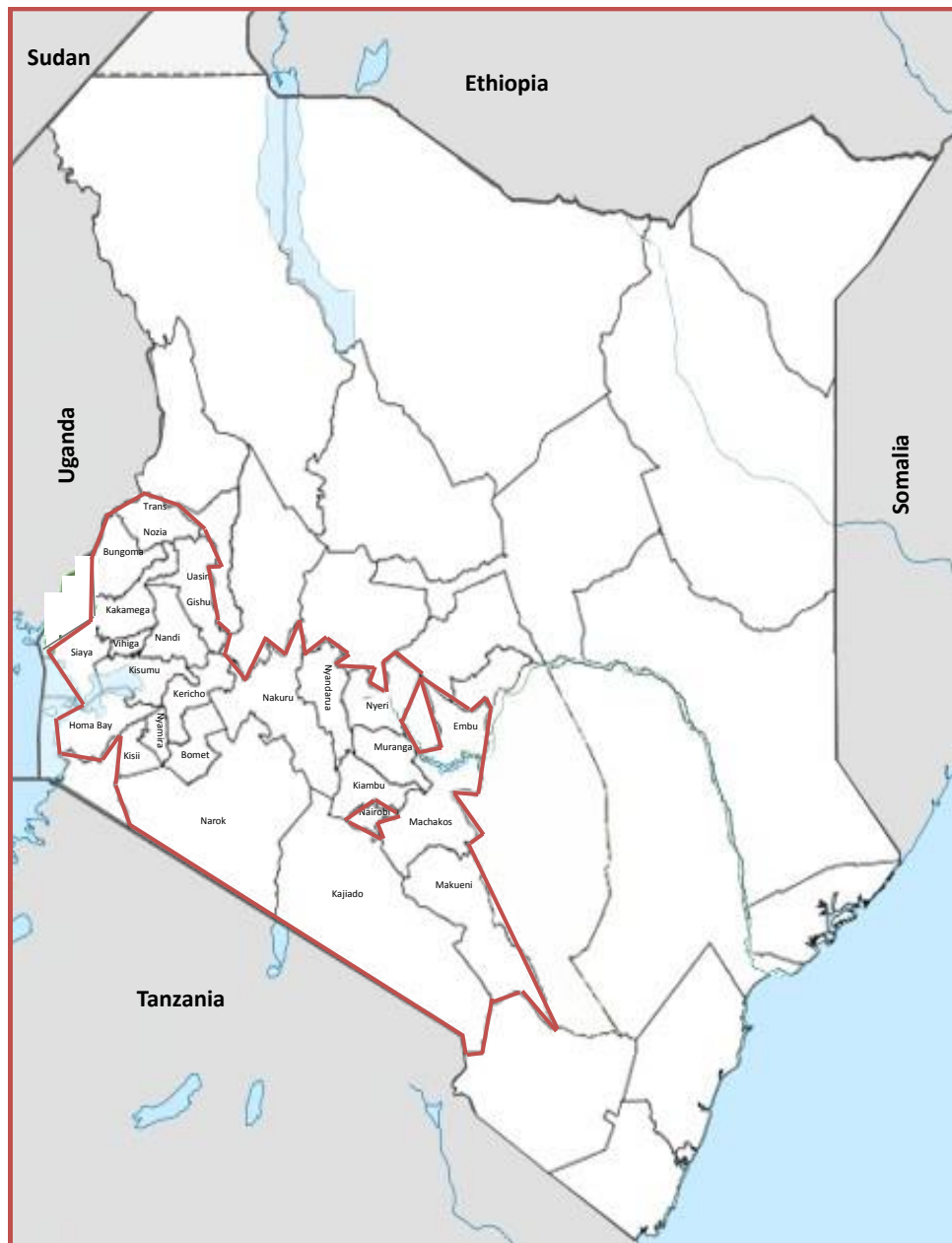


Figure 2.3: Map of Kenya highlighting study area

2.6 Sampling, Weighting and Estimating Impact.

The selection of EAs from within the target area for the listing survey and the main survey was a) to provide a basis and b) to enable weighting and estimation of impact for the target area.

Sampling Rationale:

- The initial contact sample needed to be large enough to yield a large enough sample of households that had made changes in their farming influenced by SSU for appropriate analyses to be undertaken. Estimates of the expected number of households that had made changes were informed by previous surveys which had

been purposively sampled (as opposed to random sampling). It was estimated that from a random household sample, about 15% would be SSU viewers, of which close to a third would have made a change in their farming.

- The study concentrated on impact at the household level and the interviewee had to be the main decision maker on agricultural issues.

The study population is defined by the population of households in the counties targeted by SSU during their broadcasts seasons of 2012 and 2013. 120 Kenya National Bureau of Statistics (KNBS) Enumeration Areas¹ (EAs) were randomly selected. Information of the EAs was from the 2009 census; the majority (102) were rural, whilst 18 were peri-urban. The number of households per EA ranged from 20 to 309. All households within each EA were listed (14,986 of which 9,885 completed questionnaires²). Based on listing, 1,572 households were selected for the main survey (893 SSU-viewers and 679 non-viewers). The estimates for the key indicators to answer research questions come from these two surveys. As a consequence of the rate of viewership of SSU being lower than expected, the sample of viewers covered all viewers in each EA.

Weights

Sampling weights were developed to enable estimation of quantities of interest at population level. These weights were derived using information from the sampling frames as per the initial design, but were adjusted to reflect the final composition of the dataset. Corrections were needed due to the replacement of one EA and the refusal to collaborate from another EA. Adjustments were also needed to reflect the fact that all viewers of SSU were interviewed in each EA in contrast with the sample that was planned as there were fewer viewers of SSU than predicted. Estimation of key variables of interest was done using the SVY commands of STATA, which allow the declaration of the sampling scheme and weights, and allow the estimation of appropriate confidence intervals.

The exclusion of urban areas from the sampling frame may lead to the charge that the sampling frame excluded important segments of the population that watch SSU. The justification for this decision is based on the following points: The evaluation survey targeted areas where agricultural production takes place. However, there is relatively little agricultural production taking place in urban EAs. All households in the rural and peri-urban EAs had a quantifiable probability of being selected into the sample. The survey identified farming households in rural areas that receive money or instructions from individuals living in urban areas and these individuals made up only a small proportion of the sample population. The decision-making structure and source of finance for their agricultural enterprises did not affect their probability of selection into the sample.

¹ KNBS has divided Kenya into EAs, each containing approximately 100 households, though there is a wide variance.

² See appendix X (main survey report) for detailed breakdown of responses.

Imputation only took place when the data collected was considered to be of doubtful quality. Outliers were identified using parameters established in the detailed PQR work. In these cases we have two options: a) adjust weights so that the remaining households in the sample account for the whole population or b) impute the value of the gross margins considered to be of doubtful quality using the sample average. Option b was chosen as it was easier to implement in the time available.

Logic of the estimation of the net effect of Shamba Shape Up

The conditions under which this evaluation was carried out were such that:

- No baseline was available
- Any assessment of production and costs had to be obtained from interviewee recall as the agricultural season of interest had already gone

This means that the only option available was to collect data through recall during the interview, two groups were identified during analysis: i) households who acknowledged having watched SSU and made changes in their agricultural practices as a result of SSU and ii) households who do not watch SSU and have not made changes in their agricultural practices as a result of SSU. From these two groups, estimates of gross margins for the selected agricultural enterprises of the evaluation were calculated on a per farmer basis. These estimates included confidence intervals. The 95% confidence interval was used to determine the extent to which the two groups are likely to have different gross margins. The net effect of SSU on gross margin was estimated by taking the difference in the estimates of gross margins of the two groups. The calculation of the total contribution to the economy of the SSU target population was done by grossing up to the number of SSU viewer changers in the overall SSU target population that grows maize or keeps dairy.

2.7 Listing Survey

Data collection began on 9th April and ran through to 24th May. The field team worked closely with KNBS staff and local hierarchies (assistant chief / sub-area chief and village elders). Having these authorities with the listing team was important in ensuring accurate and transparent participation. The listing questionnaire was scripted for Computer Assisted Personal Interviewing (CAPI) application and uploaded onto android phones for use in fieldwork. The tool focused on identifying household decision makers who were viewers of SSU and were engaged in one or more of the three enterprises of interest, maize production, dairy or broiler production.

All households were visited and GPS co-ordinates for each interviewed household were captured. Where the key decision maker was unavailable during the first visit, two call-backs were made during a two-day period while the survey team was still within the EA.

Of the 120 EAs that were provided by KNBS, 119 were listed. EA Gatuiri D in Kirinyaga County was a rice-field, so KNBS provided a substitute EA: Marurumo. EA Kentmere

Estate is a private, large farm and management refused to participate; KNBS did not provide a substitute. A full breakdown of the listing survey is presented in appendix D.

2.8 Main Survey

The main survey was timed to follow at least one week behind the listing survey team. Once the listing teams uploaded data for a particular EA, the selection of the SSU viewer and non-viewer was done randomly using an excel formula / template. This randomisation was conducted by the data manager who then sent a list of the selected interviewees to the team. The target was to have 15 viewers and five non-viewers selected randomly in each EA. However, this was not possible in a number of EAs as there were fewer SSU viewers than expected. Irrespective of the number of SSU viewers, a conscious effort was made to complete the five non-viewer interviews.

The listing survey identified 1,208 SSU viewers. The main sample completed questionnaires with 893 viewers and 679 non-viewers. On average an interview took 75 – 90 minutes and fieldwork ran from 17th April to 30th May 2014. GPS coordinates were taken for all successful interviews. The breakdown of main survey respondents is presented in appendix D.

Main study challenges

A number of those interviewees selected were suspicious of a second visit and felt that they had already given the team time during listing and were unwilling to participate further. Those identified were listed as unavailable. In some selected households the decision makers were involved in multiple income generating activities and could not be found at home. Multiple efforts were made to reach selected interviewees, including home visits and phone calls. In a bid to interview as many of the SSU viewers as possible an interviewer would remain in an EA for 2 days following up on an interview.

Village elders or other villagers helped to identify the households selected, however there were cases where potential interviewees used names that were unknown to other villagers, making it difficult to locate them. Some of the phone numbers given during listing were incorrect. These issues meant that the listing team had to re-visit some EAs to help identify some of the selected interviewees.

A few interviewees initially reported as non-viewers during the listing survey realised that the interview focused on SSU and changed status, claiming to be viewers of the programme. They may have done this as they did not recognise the name of the programme during the listing survey, the listing interview may have been with a different household member or respondents may have suspected that there were some benefits of reported viewership, such as shooting the programme at their farms which would result in further investment by the SSU team. Accurate estimates of land size were important for comparison and for understanding the impact of SSU so a mobile application was used to estimate acreage, though in many cases the farmer could not identify their exact plot boundaries. In addition,

some maps on Google Maps were not recent and showed areas which have since been cleared meaning current boundaries could not be identified. The mapping exercise was used in those areas where it was feasible and elsewhere farmer estimates of plot sizes were used.

The design of the questionnaire required farmers to discuss each plot on which they had grown maize in the last season. However, for some farmers with low acreage they treated all the plots as one and gave total amounts of fertiliser, seeds, and labour.

2.9 Data Entry, Management, Checking, Cleaning

To ensure listing survey field quality control, supervisors spot-checked 10% of all questionnaires. The KNBS enumerator also accompanied approximately 12% of all interviews. To check that listing was done correctly, two EAs were listed twice and checking of the number of households recorded revealed similar results. In a number of EAs the number of households listed was lower than what had been expected based on the KNBS list. These discrepancies were mainly as a result of searching to specifically interview the decision maker of a household.

Main Survey Field Quality Control.

Twenty per cent of the interviews were selected randomly for telephone call-backs. The focus was to ask demographic questions such as household size, land size and how long the interview took. A supervisor observed a further 12% of these interviews. Data from back-checks was compared with the main survey with no major discrepancies noted. Originally the intention was to back-check SSU viewership, however it was realised that the interview sensitised some non-viewers who then proceeded to watch the programme following the interview.

Data cleaning

- With the data received, a series of checks were run to detect inconsistencies and errors. This process generated queries that were sent to the data collection coordinator for explanation. Appropriate adjustments were made for the final dataset considered suitable for processing.
- When gross margins for maize and dairy were examined, it was decided to explore them in relation to the area of land (or number of cows) in the household. There were a small number of cases where the gross margin was far larger or smaller than gross margins expected with the resources available to the household (thresholds per cow and per acre were set using findings from the PQR work). In those cases, the decision to remove the reported gross margin was made and the value was replaced by the average of the group to which the household belongs. The size of the bias introduced was considered to be negligible given the number of replacements and the levels of variability of gross margins at household level.

2.10 Analysis of Results of Listing and Main Surveys

Data from the listing and main survey were entered into SPSS and analysis was carried out by researchers in the Statistical Services Centre and the School of Agriculture, Policy and Development at the University of Reading. The analysis packages used were SPSS and STATA.

The main measure used to estimate the effect of SSU was the gross margin for maize and dairy. Gross margins are the total produce of an enterprise (calculated as if all yield is sold) minus the total variable costs of the enterprise.

The variables used to calculate the gross margins for maize and for dairy are shown here:

$$\text{Maize gross margin} = \sum_{r=1}^2 y_r p_r - \sum_{i=1}^3 q_i c_i$$

Where y represents total yield of maize (kg); r indicates maize type (1=shelled; 2=green); p indicates average price of maize; q indicates quantity of input; i refers to input ($i = 1$ fertiliser; $i = 2$ seed; $i = 3$ manure; $i = 4$ top dressing fertiliser); c_i refers to the cost associated with input i .

$$\text{Dairy gross margin} = \sum_{s=1}^2 m_s n_s p_s - \sum_{t=1}^3 a_t c_t - l$$

Where m represents average production per cow per day; n refers to the average number of cows milking; s indicates season (1=wet; 2=dry); p indicates average price of milk; a indicates the number of times a treatment has been applied; t refers to the type treatment ($t = 1$ spraying; $t = 2$ deworming; $t = 3$ mastitis); c_t refers to the cost associated with treatment t ; and l refers to the amount spent on supplements or salt licks in the last year.

Category definitions

To be able to attribute change and understand the effect of SSU it was necessary to categorise households. This was done at the beginning of the analysis of the main survey data. The following categories characterise farmer respondents by their answers to questions regarding the two enterprises (maize and dairy) and specific practices analysed (table 2.1). These categories were determined following close investigation and analysis of the survey results, which resulted in the reported types of SSU viewers and intended audiences. It is clear that respondents will either be watchers of SSU or not. While respondents may be able to report to have been influenced by SSU in their agricultural practice, the degree of influence is more difficult to ascertain.

Initially four categories for each enterprise were determined:

- **Viewers –influenced by SSU** – These respondents stated that they were SSU viewers and that they received information from or were influenced by SSU to carry out a specific practice related to a specific enterprise

- **Viewers – not influenced by SSU** – These respondents stated that they were SSU viewers but did not indicate that they had received information from or been influenced by SSU to carry out a specific practice related to a specific enterprise
- **Non Viewers – not influenced by SSU** - These respondents stated that they were not SSU viewers and did not indicate that they had received information from or been influenced by SSU to carry out a specific practice related to a specific enterprise
- **Non Viewers –influenced by SSU** - These respondents stated that they were not SSU viewers but that they had received information from or been influenced by SSU to carry out a specific practice related to a specific enterprise

Respondent results from the fourth category were dropped following the analysis of the main survey due to the very small sample size of respondents in this category (n = 33 or 2%), which led to results that were not generalisable.

The three remaining categories are used throughout the analysis in sections 3.3 and 3.4 to ascertain the level of effect that SSU is having on households in the study area.

It is important to note that the questions and administration of the questionnaire were designed so that respondents did not know that the study concerned SSU. This was to attempt to ensure that respondents were not influenced consciously or sub-consciously to focus on SSU. Allocating respondents to the categories above was therefore based on analysis of questions that asked about sources of information and influence regarding the particular dairy and maize practices. SSU was listed as one of a range of possible sources of information and influence that respondents could identify. At the end of the questionnaire after all other sections had been completed respondents were asked specific questions on SSU (e.g. regarding perceptions of usefulness, willingness to pay etc...).

2.11 Participatory Qualitative Research

The Participatory Qualitative Research (PQR) phase was part of a wider impact assessment for SSU, which specifically focused on establishing the processes through which smallholder farmers interact with SSU, the extent to which they are making changes to their farm enterprises influenced by SSU and the social and economic effect of those changes on the farm and household. The PQR relied on both the listing survey and the main survey data for the identification of the sites and participants involved in the research. Specific participatory tools used included 1) Participatory Budgets, 2) Effects Diagrams, 3) Focus Group Discussions and 3) Key Informant Interviews. Participants were selected from those interviewed in the listing and main surveys and in some cases, snowball sampling was used to identify additional participants. Research tools were developed by the PQR Team and were piloted in the field with small groups of farmers before being refined and then employed in the data collection.

(i) Data Collection

Participatory Budgets (PBs) are participatory farm management (PFM) tools that are used to understand how farmers allocate resources on their farm and can be used to isolate changes in farming practice that may have a positive or negative outcome. The tool is straightforward and involves a researcher sitting with a farmer or a group of farmers to draw up a budget sheet of activities, inputs and outputs over the course of a season or year. Symbols are used to depict activities and counters are used to depict resources (labour, cash, fertiliser etc...) and produce (harvest, by-products etc...). For this study a PB concentrates on one particular enterprise (maize, dairy or poultry) and the farmer completes two separate PBs. The first PB depicts the most recent season, recorded all of the inputs and outputs on the enterprise, leaving the farmer with either a profit or a loss in terms of cash and also a clear record of produce for consumption. The second PB provides the counterfactual. The change (i.e. a practice or practices now used as a result of SSU) which has been identified during the introduction to the exercise, is isolated and the second PB is compiled by the farmer to display how the same enterprise would have performed under the same conditions but using the practices that they carried out before the specific change was made. The two PBs can then be compared and the difference made by the change can be isolated. Participatory budgets were also compared between farmers who had used practices as a result of SSU and those who had not.

Effects diagrams were used to identify and, importantly, quantify financial and other, non-financial, gains of the practices and changes that farmers had implemented on their farms. The balance from the PB activities was taken forward and participants were asked to quantify what the extra profit, increased produce for consumption, or indeed the loss of profit meant in reality for the household (i.e. the effects). Effects diagrams allow the researcher and participant to capture, visually, the changes that households have experienced as a result of the change they have made.

Focus Group Discussion (FGD) participants were drawn from the listing survey and were separated by gender for disaggregated analysis. Ten FGD activities were carried out to help in understanding the process through which changes occur within agricultural enterprises. Activities / tools used within these sessions included:

- ***Agricultural Timelines***: were used to develop an overall picture of the agricultural system in each of the study sites.
- ***Enterprise Histories***: were used to gain an understanding, anchored in specific examples, of how changes in the selected agricultural enterprises (maize, dairy or poultry) had taken place in a smallholder farmer context. Enterprise histories identify the source of change, the process by which it entered the community, the actors involved in developing, providing, demanding the change and its impacts.
- ***Communication Maps***: established a list of all the organisations, institutions and individuals with which farmers and other local stakeholders were linked at local, county and national level; capturing actual or potential channels of communication

and sources of information. The communication maps build up a visual picture of the agricultural innovation system in an area.

Key Informant Interviews (KII) were conducted with three categories of interviewees; service providers, key farmers and urban-based viewers. The service providers who participated included public extension agents, county government officials, input distributors, agro-vet stockists, traders and seed distributors. Farmer key informants were drawn from the FGDs and were used to develop farmer case studies. The last category consisted of urban based SSU viewers who were identified through initial activities (PBs and FGDs) before follow-ups and interviews by the research team.

The total numbers for each PQR activity is presented in table 2.2 below:

Table 2.2: Breakdown of PQR activities

Tools	Clusters	Muranga	Nakuru	Total Nos. Achieved
Key Informant Interviews (KIIs)	Farmer KIIs (case studies)	12	11	23
	Other Actors	10	7	17
Focus Group Discussion (FGDs)	Male FGDs	1	1	2
	Female FGDs	1	1	2
	Male & Female FGDs	3	3	6
	Total	4	4	10
Participatory Farm management tools - Participatory Budgets	Maize PBs	18	19	37
	Dairy PBs	15	6	21
	Poultry PBs	5	9	14
	Total PBs	38	34	72

(ii) Study Areas

The PQR was carried out in two Counties of Central and Rift Valley Provinces of Kenya (figure 2.4). Muranga and Nakuru Counties were selected based on preliminary findings indicating the two counties had a higher proportion of SSU viewing farmers who reported implementing changes in their maize, dairy or poultry enterprises based on information / influence from SSU. The selected countries can be seen in the figure below.



Figure 2.4: Map of Kenya showing sites for PQR data collection

(iii) Challenges

Conducting single enterprise participatory budgets at farm level is challenging; enterprises are interdependent on labour and inputs, which may have affected outcomes from this process. This was further complicated as some farmers own multiple plots, share inputs and purchase a wide range of inputs. Most farmers do not keep farm records, which makes it difficult to ascertain some of the incomes and costs provided. However, budgets were conducted for the last complete season which meant that farmers were able to recall the inputs and outputs connected to the enterprise. Rural households also consume part of their produce before harvest (green maize), which presented an additional challenge of making accurate valuations of total production and incomes.

2.12 Quality Assurance

The Centre for Development Innovation, Wageningen, performed an oversight role in the impact evaluation of the Shamba Shape Up TV programme. The purpose of the oversight role was to assure good quality and objectivity of the evaluation, ensuring clear quality standards were agreed upon by all key stakeholders (Mediae, AECF and evaluators) and outlining how these standards would be addressed.

3.0 Results and Findings

This section sets out the results from the different components of the study, firstly summarising the Theory of Change, before presenting the results from the listing survey (including TV ownership and SSU viewership), the main survey (including practices, processes and influences, impact on production, overall impact of SSU, farmer perceptions and willingness to pay) and the participatory qualitative research (including detailed results on the impact of SSU and the process by which it influences households).

3.1 Theory of Change

A Theory of Change for SSU

From the literature reviewed (appendix B), a Theory of Change (ToC) can be put forward that elaborates on the basic causal chain set out in the SSU funding agreement.

SSU is a new departure in agricultural programming. It brings a particular format of reality television – the ‘makeover’ – to a novel context, that of smallholder farms and farming in Kenya. It is very different from conventional ‘farm broadcasting’ which seeks simply to transfer information to large numbers of farmers, beaming information into millions of homes at a fraction of the cost of an extension worker meeting with an individual farmer, or a group of a few dozen farmers. SSU incorporates key ideas from mass media theory, good practice in extension and advisory services and innovation systems frameworks. A theory of change on which an impact assessment can be based should reflect this.

SSU goes far beyond the broadcasting of information, from a pre-scripted lecture or documentary or discussion; beyond even the interactive ‘phone in’ format that is now widely used in farm radio programming. It brings multiple experts to a farm household, something that would never happen on the farms of the millions who watch SSU, and the audience has an opportunity to share in the learning process of the host farm household. SSU represents social learning, which is an essential element in more interactive, participatory approaches to agricultural extension and innovation. The audience eavesdrops on the conversations between household members and experts, understanding and empathising with the former and wanting to see how the latter will find a positive way forward for the farm. A key feature of good reality television is that the audience’s emotions are engaged, not just their cognitive faculties. If the farm has been selected well, then many in the audience will identify with the situation, challenges, doubts and aspirations of the host family.

The ToC for SSU is illustrated in figure 3.1. There are four parts to this ToC:

(i) *Production*

The producers of SSU bring together three different parties, each with an interest in ensuring smallholder farmers are supported in improving their farms and livelihoods: funders of the programme, research scientists and farmers. This way SSU manages to address the supply

(funders and research scientists) and demand (farmers) sides of the provision of agricultural information.

(ii) *Broadcast*

An episode of SSU contains useful information, but it is much more than a simple vehicle for that information. Information and advice are presented in a context in which they are useful and are likely to receive a positive response. The audience is able, vicariously, to share in the process by which the farm household comes to a decision on the changes to try out on their farm. The broadcast also gives information on where farmers can source inputs they might need and on the government, NGO and commercial support that is available. The process of design and production, and the broadcasts build in current ideas on good practice in extension and incorporate an understanding of the role of media in society and social and economic change

(iii) *Audience*

The SSU audience identifies with the household on screen, not necessarily because they live in identical circumstances but because they share the same aspirations of wanting the best for their families and their farms. This leads to empathy for the household and engagement with the process of identifying opportunities for change, enhancing the likelihood they will learn, remember and try out ideas that are relevant to their own farm. Farmers are also likely to discuss the broadcast within their family and with other farmers, which may lead them to seek further information either from SSU or from more local sources, enhancing the learning process and potential to try out new ideas.

Not all of the audience will be farmers. Many will be living in urban areas with relatives in their home village who may contact them to discuss what they have seen on SSU. In many cases, these urban viewers may be key decision makers on the family farm and may be the ones who can provide investment to put new ideas into practice. Other viewers may include extension workers or other actors within the farmers' innovation system; they may find that the programme helps them to learn how they can be more effective in their support for farmers. The flow of information is not only from the broadcast to the farmer, but via multiple channels. This way, SSU can be seen to be supporting the whole innovation system.

(iv) *Outcome*

The impact of SSU on incomes and livelihoods and the wider agricultural economy will be felt through the outcomes of changes that farmers make in their farm enterprises. Ideas featured on SSU aim to lead to increases in one or more of the following: output of a featured commodity; yield per unit area or animal; use of purchased inputs; prices received for produce sold (through improved quality or more effective marketing); net returns from an enterprise; nutrition and food security for the farm household.

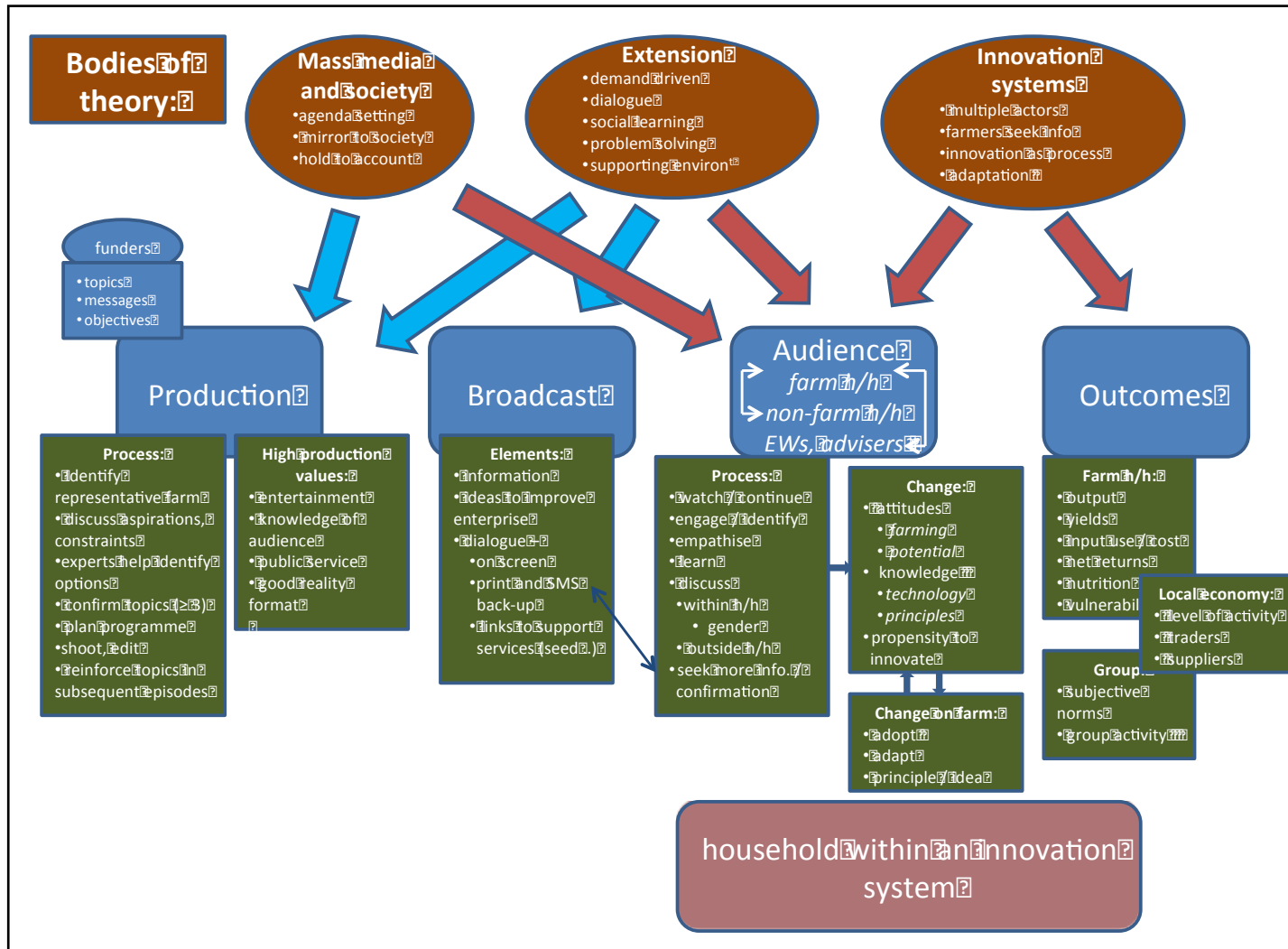


Figure 3.1: Theory of Change for Shamba Shape Up

3.2 Listing Survey Results

The listing survey gathered data about respondents and their farming households, including their age, gender, the farming enterprises that they practice, TV ownership and viewership and whether or not they watch SSU. The number of households surveyed totalled 9,885.

The total number of households in the 26 counties within the study area was 2,915,154. All counties included in the survey, had access to working TVs and TV coverage (figure 3.2).

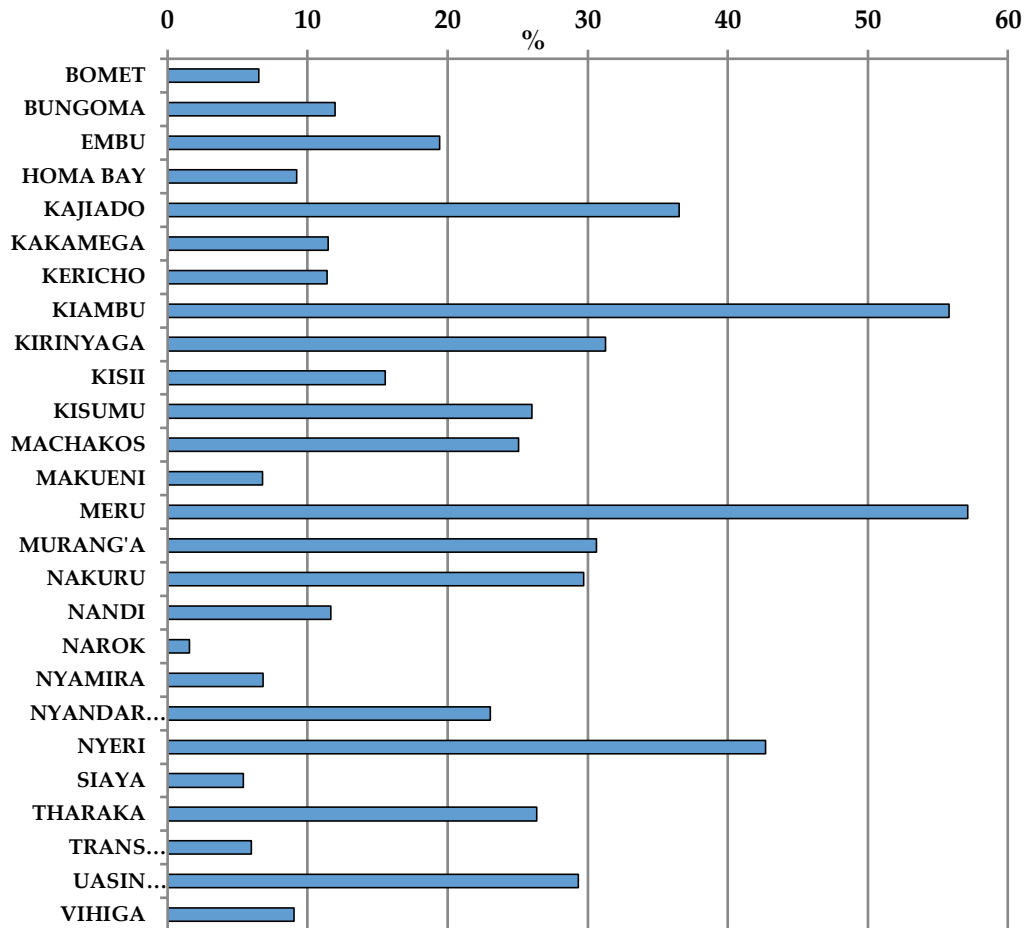


Figure 3.2: Percentage of Households with a working TV, per County

These counties were randomly selected specifically because they are within the main area for SSU programme distribution. The estimated number of households (based upon weightings) in the study area that had watched TV in the four weeks before the survey was 948,388 (32.5%³) and the number of households with working TVs in the target area is estimated at 637,851. This represents approximately 21.9% of households. While all counties had some degree of access to television, several had very small proportions of households that own working TVs. These counties included Narok, Trans Nozia and Siaya at 2%, and

³ This figure is very similar to the estimate from IPSOS / KARF (33%) quoted in the overview of television in Kenya (appendix C).

5% respectively (figure 1). Counties with the highest level of TV ownership included Kiambu and Meru (55.8% and 57.1% respectively).

Considering those households who owned working televisions (figure 3.3), the majority (65.8%) relied on electricity from the grid as their main power source, however, a relatively large proportion (32.2%) used solar as the main power source to their televisions.

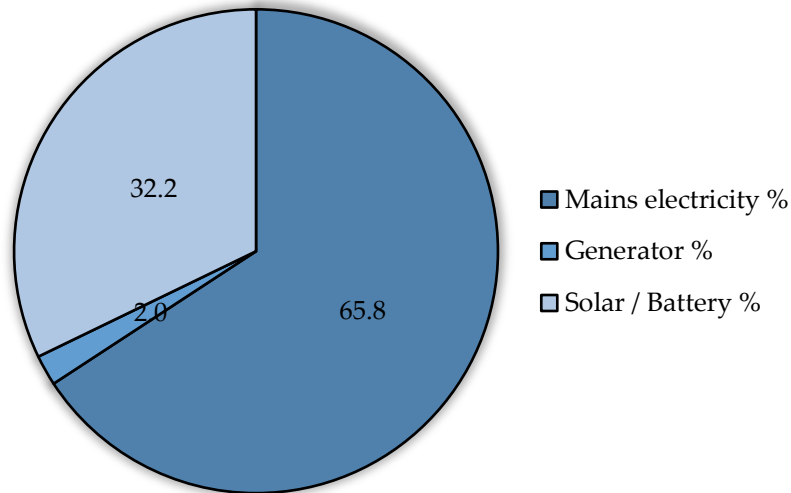


Figure 3.3: Power Source by TV Owners

The listing survey estimates that 368,407 (12.6%) households⁴ in the study area watched SSU within the four weeks leading up to the survey. This means that, as a proportion of those who actually watched television in the previous four weeks, more than a third of viewers watched SSU (38.9%).

While the majority of viewers watch SSU in their own home (figure 3.4), a combined 43% of all viewers reported that they watch the programme at an external venue such as a neighbour's house or another public place, suggesting that communal viewing of SSU is popular.

⁴ The level of viewership was estimated on a household basis so the actual number of viewers is likely to be higher than this.

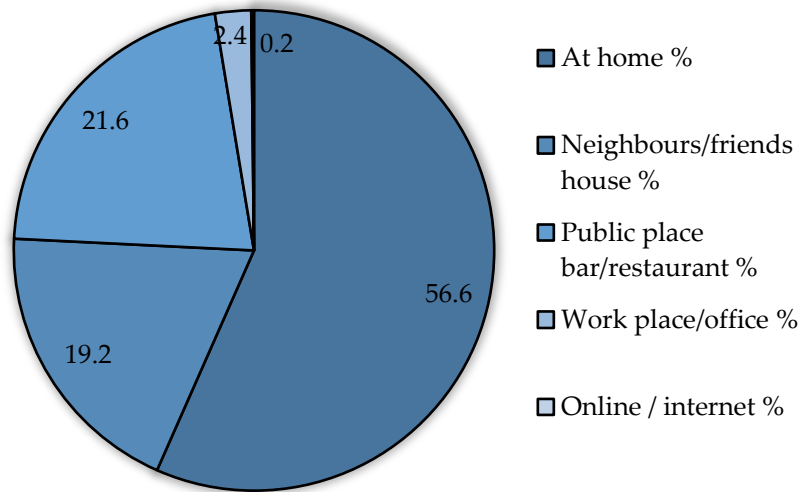


Figure 3.4: Locations of where respondents watch SSU

As indicated above, 12.6% of listing survey respondents reported to be SSU viewers. Those respondents who did report to be SSU viewers were regular watchers (figure 3.5); almost half (43%) reporting that they watch every two-three weeks and more than a quarter (26%) stating that they watch the programme every week.

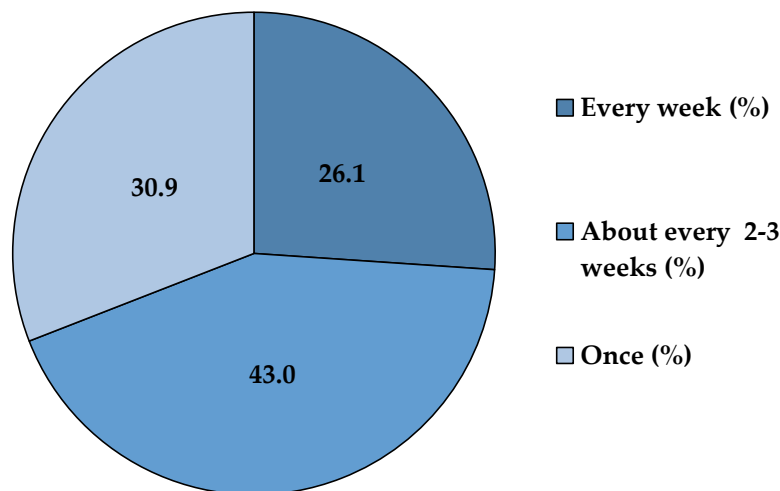


Figure 3.5: SSU viewing frequency in the previous four weeks

3.3 Main Survey Results

This section outlines the results from the main survey data collection. The section is based around the categories outlined in section 2.10. It begins by outlining the social and economic characteristics of the respondents and their households and compares these across the three categories. The practices that are promoted by SSU are then investigated to explore how SSU is influencing farmers and how it compares to other information sources. Production is

then analysed across the categories, both respondents' perceptions of how this has changed and the actual yields that they have recorded.

3.3.1 Social and economic characteristics

The parameters of the main survey are outlined in section 2.8. As is discussed in that section, attribution of change and the effects of that change are difficult. It was important to ensure that the social and economic characteristics of the households in the survey sample were thoroughly investigated to ensure that the categories used for comparison / analysis of effect were different only in their relationship with the SSU TV programme. The detailed analyses of social and economic characteristics are presented in appendix E and summarised briefly here.

With regards to age and gender of respondents there were no significant differences between the categories outlined in section 2.10. Other household characteristics, including gender of household head and size of household also showed negligible differences. Farm and herd sizes are similar across the defined categories and the way that the categories are split across agro-ecological zones is unlikely to skew the gross margins that are used as a measure of impact.

There were differences in the level of education of respondents across the three categories. Respondents who recorded higher levels of education were significantly more likely to be *viewers, influenced by SSU*; whereas respondents with lower levels of education were more likely to be *non-viewers, not influenced by SSU*. Viewers of SSU, whether they were influenced or not also, on average, scored higher on the Progress out of Poverty Index (PPI⁵). SSU viewers are considered to be less likely to be below the \$2.50 per day Purchasing Power Parity poverty line. It is important to note that PPI score may be a cause or an effect of the respondent's relationship with SSU. It is also important to note that when maize farmers were considered there was no statistical relationship between PPI score and maize gross margins and when dairy farmers were considered PPI scores only explain one per cent of the variation in dairy gross margins.

Respondents that were least likely to watch and to attribute influence to the programme were those with the longest farming experience. The other difference across the categories was in source of income. Viewer non influenced respondents are significantly more likely to earn most of their money from an occupation that isn't farming and non-viewer non-influenced respondents significantly more likely to earn most of their income from farming.

3.3.2 SSU Practices, Processes and Influences

SSU covers a wide range of topics across the agricultural spectrum. For the purposes of this research, three of the leading enterprises were selected for in-depth analysis: maize, dairy and poultry. Due to the small number of respondents (1.3%) reporting to be involved in

⁵ PPI is a poverty measurement tool. For more information see <http://www.progressoutofpoverty.org/>

poultry enterprise⁶ only maize (92.1%) and dairy (53.6%) enterprises are covered in this results section. The practices recommended and demonstrated by SSU differ by enterprise and only the most commonly promoted practices were analysed. Overall 12 practices were analysed for maize and 13 for dairy.

(i) Practices promoted by SSU

The twelve maize practices that have been promoted by SSU are shown in table 3.1. The percentage of respondents from each category who reported to utilise the practice is recorded. Some individuals may have started these specific practices before SSU programming and some may have adopted part or all of the practice from the influence received by SSU.

Table 3.1: Maize practices promoted by SSU and the proportion of each category practicing

Maize Practices	Viewer - SSU influenced	Viewer - not SSU influenced	Non viewer - not SSU influenced
N=	245	569	595
Apply fertilizer at planting	69.4%	49.4%	49.7%
Apply fertilizer mixed with manure at planting	11.4%	8.6%	5.4%
Apply manure at planting	21.2%	21.3%	18.0%
Purchase maize seed from a agro-dealer/shop	84.1%	58.0%	51.8%
Plant a crop in your maize plot as an intercrop	64.1%	43.6%	43.7%
Purchased packed seeds for intercropping from a shop/agro dealer	18.0%	8.1%	8.7%
Planted your maize at this distance 2.5 feet/75cm between rows and 1 foot/30cm between plants	48.6%	20.4%	26.9%
Apply top dressing fertilizer	53.5%	32.9%	28.7%
Weed your maize two times (or more)	80.8%	48.0%	53.9%
Planted Desmodium in the maize field	1.6%	.4%	.2%
Use Actellic in your stored maize	38.0%	14.8%	11.6%
Test the soil in your farm	1.2%	.4%	.3%

As shown in table 3.1, the most popular practices for viewers who are also influenced by SSU are: purchasing maize seed from an agro-dealer/shop (84.1%); weeding maize two times (or more) (80.8%); applying fertiliser at planting (69.4%); intercropping (64.1%); applying top dressing fertiliser (53.5%); and using spacing suggested in best practice advice (48.6%).

Eight of the ten practices that have large enough samples (the six listed in the previous paragraph plus purchasing seed for intercropping and using actellic in stored maize) to test significance show that viewer SSU influenced households are significantly more likely ($r^2 <$

⁶ A possible scenario for this could be that while many households own chickens, it is not common for this practice to be considered as it was defined in the survey 'broilers housed or fenced only for meat (and not eggs)'. Also, the price of chicken feed had risen dramatically which had led to some farmers leaving their broiler enterprise.

0.01) to carry out the practice promoted than the other two categories. It is important to remember that the practices suggested by SSU are some of the most common practices used as well as demonstrated in Kenya by a variety of agricultural service providers. This makes attribution to a specific source more difficult.

Figure 3.6 shows that, of those viewer influenced households carrying out each of the maize practices a large proportion specifically stated that they were influenced by SSU to employ that practice.

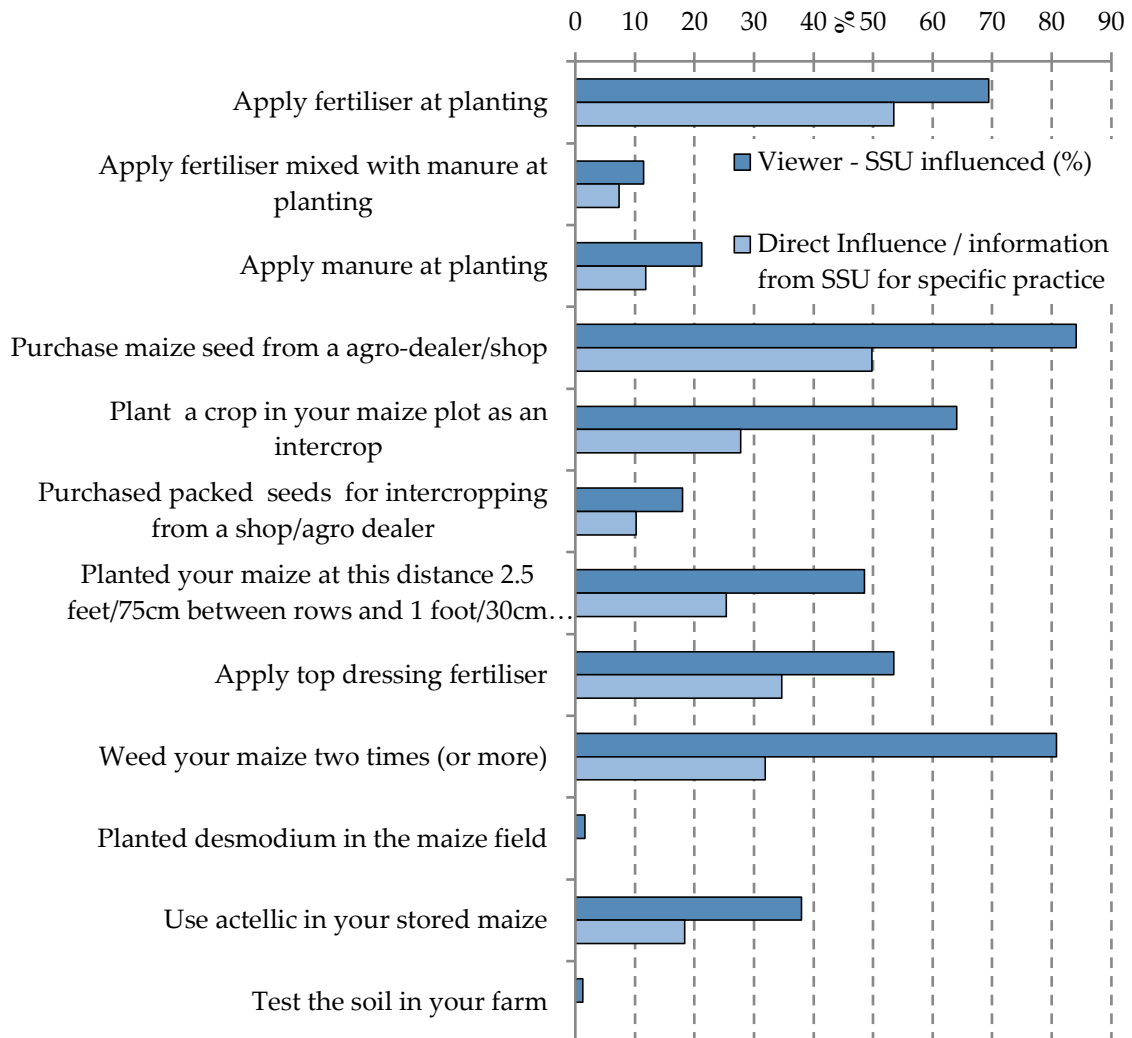


Figure 3.6: Proportion of SSU influenced maize farmers carrying out each practice and the proportion directly stating SSU as an influence that led to that specific change⁷

The results displayed in table 3.1 and figure 3.6 suggest that SSU is influencing a considerable number of farmers to undertake improved practices in their maize enterprise.

⁷ The respondents reporting to be directly influenced by SSU to adopt a specific practice is a proportion of total number of viewer SSU influenced farmers. E.g. 53.5% of viewer SSU influenced households were applying fertiliser specifically because of information from SSU.

The thirteen dairy practices demonstrated in SSU programming were investigated. Table 3.2 displays the specific practices and shows the proportion of respondents in each category who have reported to utilise the practices recommended by SSU.

Table 3.2: Dairy practices promoted by SSU and the proportion of each category practicing

Dairy Practices	Viewer - SSU influenced	Viewer - not SSU influenced	Non viewer - not SSU influenced
N =	119	353	329
Increased number of adult dairy cows since 2012?	28.6%	16.7%	14.6%
Plant Napier Grass for the first time	18.5%	9.9%	5.8%
Increase the amount of Napier Grass	32.8%	12.7%	9.4%
Feed cows chopped Napier Grass	55.5%	53.3%	33.7%
Spraying cows for ticks and lice	82.4%	77.3%	68.7%
Deworm cows	86.6%	87.0%	76.0%
Treating Mastitis	31.1%	14.2%	10.6%
Making and feeding hay	9.2%	2.5%	1.2%
Making and feeding silage	5.9%	1.1%	1.5%
Purchase supplement feeds or salt licks	78.2%	71.7%	52.9%
Ensure cows have enough water all day	61.3%	64.6%	45.3%
Constructed a new cow shed	10.1%	4.5%	2.4%
Made improvements to cow shed	15.1%	4.8%	2.7%

As seen in table 3.2 the most popular practices adopted by viewers, influenced by SSU are: deworming cows (86.6%); spraying cows for ticks for lice (82.4%); purchasing supplement feeds or salt licks (78.2%); and ensuring cows have enough water all day (61.3%).

All of the dairy practices investigated show a significant difference ($r^2 < 0.01$) between viewer influenced and non-viewer non-influenced households, meaning that viewer influenced households are significantly more likely to carry out the techniques promoted by SSU. For eight of the promoted practices (increasing number of adult cows, increasing amount of Napier grass, treating mastitis, making and feeding hay, making and feeding silage, making improvements to cow shed (all $r^2 < 0.01$), planting Napier grass for the first time and constructing a new cow shed (both $r^2 < 0.05$) viewer SSU influenced households were more likely to carry out the practices than viewer non-influenced households.

Figure 3.7 shows that, of those viewer influenced households carrying out each of the dairy practices a large proportion specifically stated that they were influenced by SSU to employ that practice.

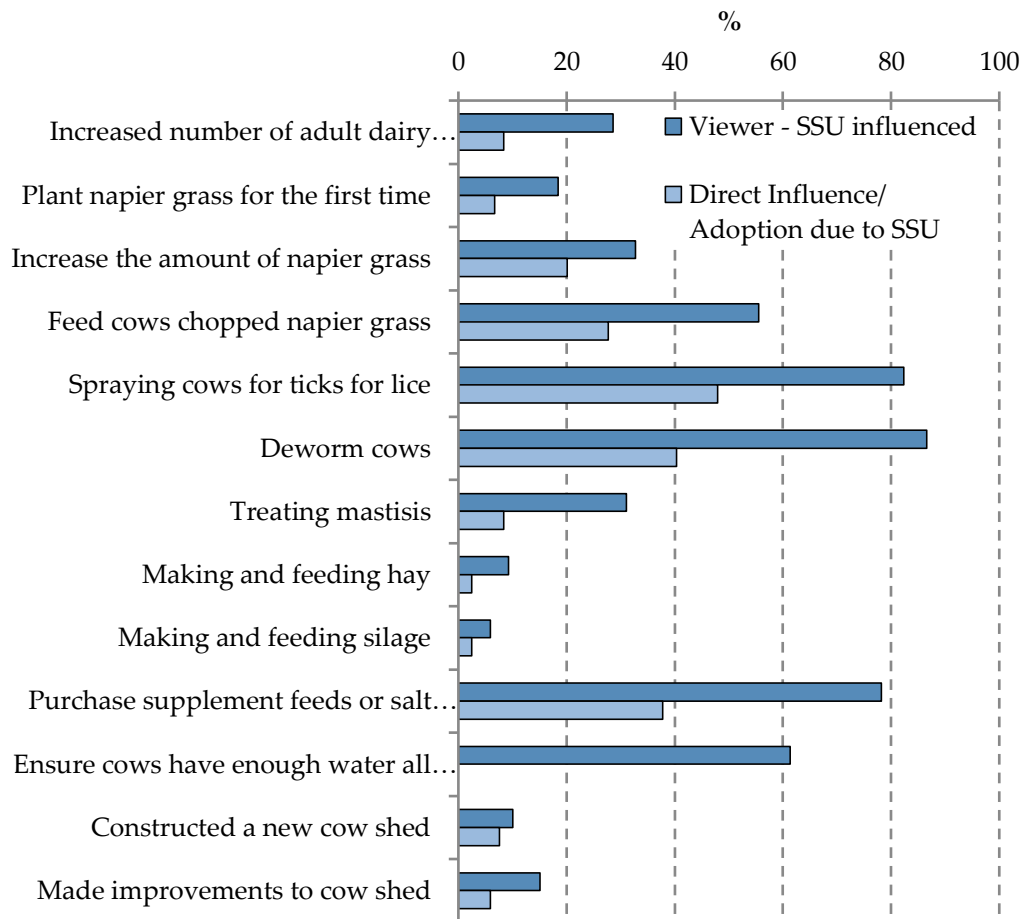


Figure 3.7: Proportion of SSU influenced maize farmers carrying out each practice and the proportion directly stating SSU as an influence that led to that specific change

This, similarly to maize enterprises, suggests that SSU is encouraging farmers to take up best practice techniques for improving dairy enterprises.

(ii) Farmer Information Sources

Maize farmers reported that they receive agricultural information from a number of different sources including SSU (table 3.3). The most popular information sources for maize farmers were friends and / or family, followed by the radio, agricultural extension and agro-dealers. The fifth most popular source of information recorded was SSU, influencing 202,190 households. This compares well with other TV programmes, agri-vets, NGOs, newspapers and religious organisations.

Table 3.3: Information sources utilised by maize farmers and total number of practices influenced

n=2,785,034 ⁸	Number of households influenced by this source	Proportion of maize farming households influenced by this source	Total no. of maize practices influenced by this source
SSU	218,562	8%	697,660
Radio	942,409	34%	2,378,370
Friend or family	1,964,083	71%	6,398,260
Agricultural Extension	598,091	21%	1,827,588
NGO	99,266	4%	290,463
TV News	108,522	4%	189,089
Other TV Programme	217,564	8%	533,181
Newspaper	109,589	4%	292,050
Agro-Dealer	410,517	15%	1,112,373
Agri-Vet	143,773	5%	356,139
Religious organisations	122,590	4%	450,150

Of those maize-farming households influenced by SSU, an average of 3.2 (61.4%) of the promoted practices carried out were directly influenced by the programme. This means that, on average, two-thirds of the best-practice techniques that viewer SSU influenced farmers undertake are driven by the influence of and / or the information from SSU.

Dairy farmers received information from a similar range of sources to maize farmers, though extension workers and agri-vets featured more prominently than radio for information / influence on dairy farming. SSU was recorded as the sixth most popular source of information for dairy farmers, influencing more households and more changes than religious organisations, NGOs, other TV programmes, and newspapers.

Table 3.4: Information sources utilised by dairy farmers and total number of practices influenced

n= 1,493,605 ⁹	Number of households influenced by this source	Proportion of dairy farming households influenced by this source	Total no. of dairy practices influenced by this source
SSU	65,063	4.4%	137,184
Radio	350,068	23.4%	783,453
Friend or family	1,068,007	71.5%	2,842,961
Agricultural Extension	394,699	26.4%	949,996
NGO	35,555	2.4%	61,089
TV News	26,305	1.8%	56,612
Other TV Programme	59,742	4.0%	108,495
Newspaper	43,919	2.9%	69,629
Agro-Dealer	169,204	11.3%	346,451
Agri-Vet	376,572	25.2%	880,874
Religious Organization	62,356	4.2%	115,160

Of those dairy-farming households influenced by SSU, an average of 2.1 (45.3%) of the promoted practices carried out were directly influenced by SSU. This means that almost

⁸ n = the number of maize farming households estimated from the main survey weighted results.

⁹ n = the number of dairy farming households estimated from the main survey weighted results.

half of the best practice techniques that viewer SSU influenced farmers employed in their dairy enterprise were influenced by SSU.

3.3.3 Production Impact/ Improvement

(i) Maize Production

Respondents were asked whether or not they felt that their maize yields (for at least one plot) had improved because of the practices that they had implemented on their farm. Viewers who were SSU influenced were significantly ($r^2 < 0.01$) more likely to report an improved maize yield due to the changes that they had made when compared to viewer non-changers or non-viewer non-changers; with almost double the proportion of respondents recording an improvement in yield (figure 3.8).

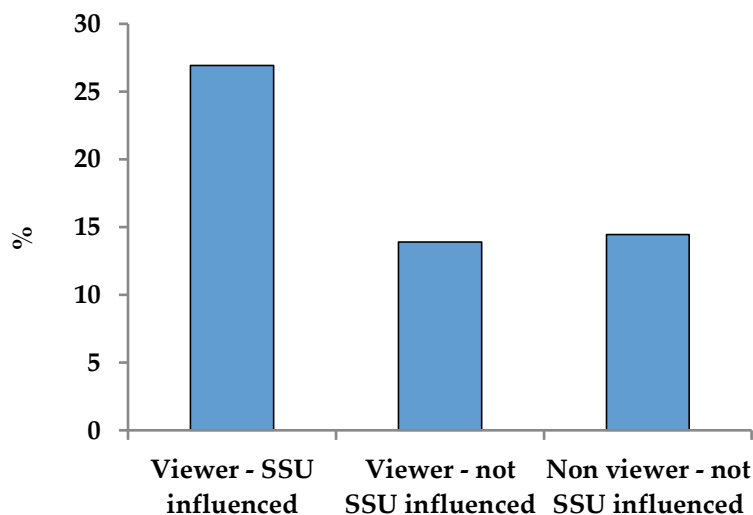


Figure 3.8: Respondents who recorded an improvement in their maize yields due to the practices that they have implemented

As well as being asked about their perception of how their yield has changed due to the practices that they have employed, respondents were asked to record their actual maize yield for the last season in which they planted. The improved yields perceived may be backed up by figures 3.9 and 3.10 as viewer SSU influenced respondents record more than double the yield of their peers for both shelled maize and green maize.

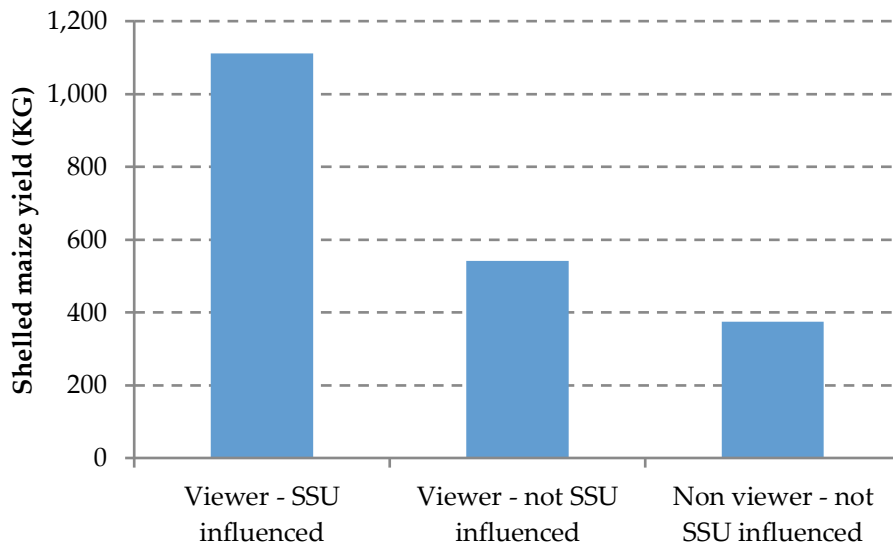


Figure 3.9: Average yield of shelled maize (KG)

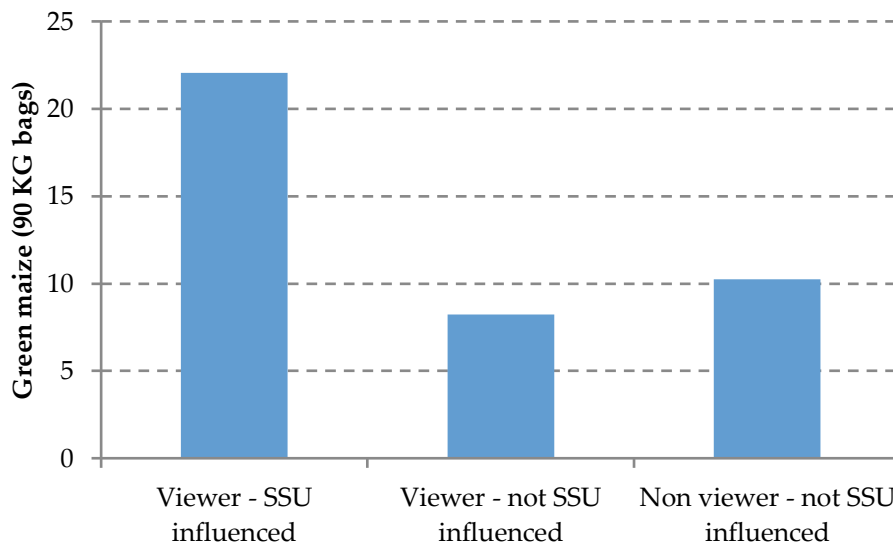


Figure 3.10: Average yield of green maize (90KG bags)

The overall picture from the maize enterprise in the study area suggests that SSU is influencing maize farmers to make positive changes in their maize enterprises and that these changes are increasing their available yield.

(ii) Dairy production

Dairy farming households were asked whether or not the practices that they were using in their dairy enterprise had improved their yields and the length of time that their dairy cows lactate. A significantly larger proportion of viewer SSU influenced respondents recorded that milk yields and the length of time their dairy cows lactate had increased since implementing the practices encouraged by SSU when compared to those households not influenced by SSU (figure 3.11). Three times the proportion of viewer SSU influenced households had seen an improvement in their milk yields and the length of the lactating

period compared to non-influenced households (18% compared to 6% non-influenced for yield and 14% compared to 3% for viewer non-influenced and 4% for non-viewer non-influenced for lactating period).

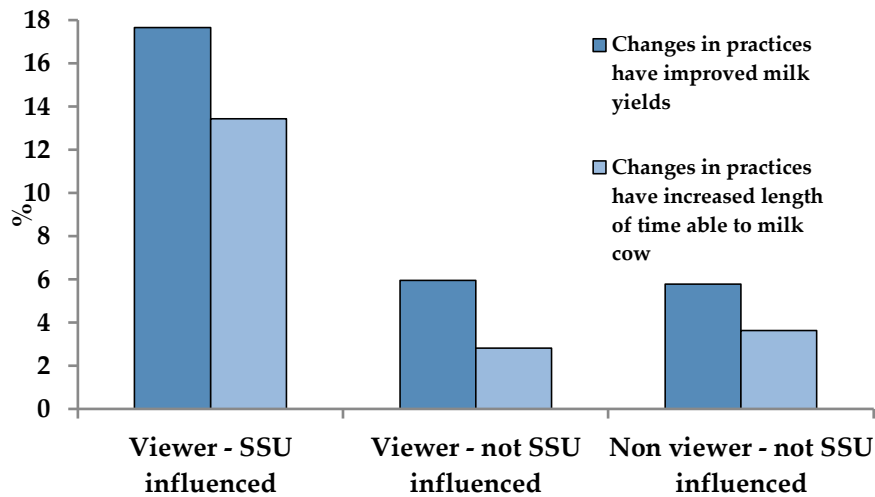


Figure 3.11: Proportion of dairy farming households recording improved yields and improved length of lactation

This perceived improvement is reflected in the yield recorded by respondents in both wet and dry seasons (figure 3.12). Viewer SSU influenced respondents' record, on average, higher yields per cow per day in both the dry and wet seasons.

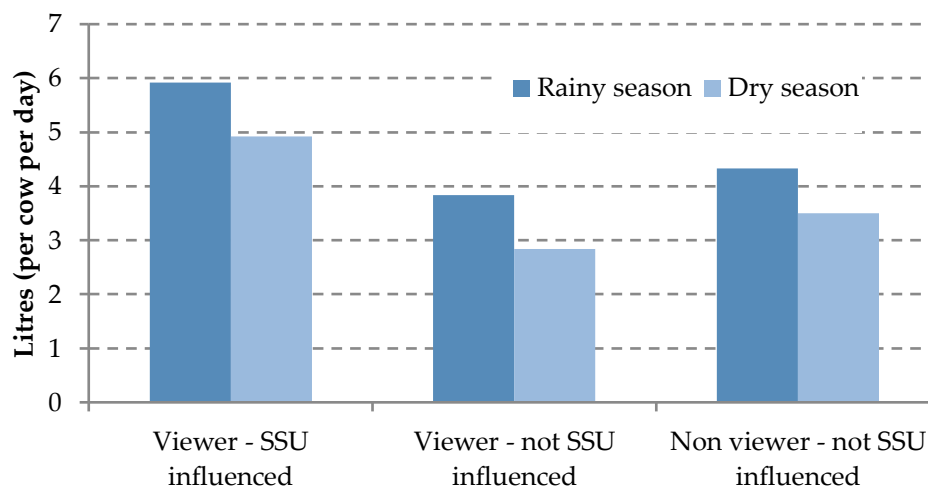


Figure 3.12: Average milk yields (litres per cow per day) in the wet and dry season

The results for dairy farmers also show a better picture for viewer SSU influenced respondents than their peers. Their perceptions and improved yields point towards improvements in the dairy enterprise in the study area because of the best practice techniques promoted by SSU.

3.4 Weighted results highlighting the effect of SSU

The research team were specifically asked to produce a range of estimates regarding the impact / effect of SSU. These included the number of beneficiaries of SSU programming, the amount by which these beneficiaries had benefited and their profile in terms of poverty status.

(i) Beneficiaries:

- The overall number of beneficiaries (those households specifically reporting that they had made changes to their maize or dairy practices as a result of SSU OR who reported that they had benefited from SSU through increased profit or improved household food situation¹⁰) is estimated to be **428,566** households (14.7% of all households in the study area)
- Viewers and non-viewers who reported making specific changes in their maize practices as a result of SSU is estimated to be **218,562** households
- Viewers and non-viewers who reported making specific changes in their dairy practices as a result of SSU is estimated to be **65,063** households.

(ii) Benefit in US\$:

The gross margins for maize and dairy enterprises were estimated on a per farmer basis including 95% confidence intervals. The difference between 'viewer SSU influenced' farmers and 'non-viewer non-influenced' farmers gross margins was used to estimate the net benefit of SSU. To gross up the net benefit to the SSU target population each of these estimates was multiplied by our estimate of the number of farmers with a maize crop (and the number of farmers with a dairy enterprise) that watched SSU and made changes.

Across the target population maize farmers who were viewer SSU influenced (97,446 households) benefited by \$578,785 when compared to maize farmers who were non-viewer non-influenced (2,151,252 households). The confidence interval for the 'viewer SSU influenced' and the confidence interval for the 'non-viewer non-influenced' show the precision of our estimation of gross margins at a 95% confidence level. The 95% confidence levels for the two groups overlap, to such an extent that a difference of \$578,785 has to be considered negligible.

Across the target population dairy farmers who were 'viewer SSU influenced' (27,157 households) benefited by \$24,139,863 when compared to dairy farmers who were 'non-viewer non-influenced' (749,245). The confidence interval for the 'viewer SSU influenced' and the confidence interval for the 'non-viewer non-influenced' show the precision of our estimation of gross margins at a 95% confidence level. The 95% confidence levels for the two groups do not overlap indicating that the gross margins for these two groups are far apart

¹⁰ i.e. those who may of benefited from information / influence on any of the enterprises promoted by SSU.

enough for the difference to be regarded as important. The estimated difference is **\$24,139,863**.

In total for maize and dairy farmers in the target population who were viewer SSU influenced the benefit is estimated to be **\$24,718,648**.

Caveat

The study had to select key enterprises to focus on and examined maize and dairy. SSU covers other enterprises and the figure reported is therefore likely to be an underestimate of impact. Figures reported are for dairy over a 12 month period and maize for the last season harvested by respondents. Estimation of benefit is based on differences in enterprise gross margins by farmers who had and had not benefited from SSU.

(iii) Profile of Beneficiaries

Of the beneficiaries, **188,569 households** (44%) are expected to be lower than \$2.50 per day on the basis of the PPI index for Kenya. It is important to note that the PPI score may have increased in some households due to interactions with SSU.

3.5 Participatory Qualitative Research

The methods used in the PQR work are outlined in section 2.11. This section summarises the detailed report. This section will begin by outlining the agricultural innovation systems at the two sites before presenting the results from the participatory budget (PB) activities, highlighting the 'real-life' effects of the changes that farmers have been making in their agricultural enterprises, and outlining the role that SSU plays in the process of on-farm change.

3.5.1 Agricultural innovation systems

As is outlined in section 2.11, the PQR was carried out in two Counties: Muranga and Nakuru. The farming systems in the two counties were analysed using agricultural timelines, enterprise histories and communication maps (see section 2.11). These tools highlighted several changes that had taken place in the farming systems, institutional arrangements and the level of service provision over the past five years. Changes revolved around growing improved crop varieties and keeping improved livestock breeds, soil management methods, pest and disease management as well as feeds and feeding. Farmers also reported climatic changes and effects associated with them including reduced rainfall amounts and distribution and increased occurrence of pests and diseases. The government's Rural Electrification Project has increased the number of households with access to electricity in the two counties and, as a result, the number of households with access to televisions has also increased.

(a) Farming systems

Muranga

The farming system in Muranga is mainly small scale in nature and farmers are mostly engaged in subsistence maize production, with some commercial horticulture. Farmers in

the area are also engaged in smallholder zero grazing dairy production, grow cash crops such as tea, coffee, avocado and macadamia and a small number have started fish farming. Land sizes in Muranga tend to be small and ranged between 0.25 and 2 acres.

Nakuru

In Nakuru, FGDs highlighted various changes in all the three enterprises as well as land use patterns. For example, unlike Muranga where maize is cultivated mainly for subsistence, farmers in Nakuru produced maize for commercial purposes; facilitated by access to bigger parcels of land (ranging between two and twenty acres) and favourable agro-climatic conditions. Farmers also practice commercial wheat farming and keep dairy animals, largely under an open grazing system (see figure 3.13). Though, land size is generally larger in Nakuru, the recent trend has been for a decrease in land size due to increasing population and the sale of land for commercial flower farming.

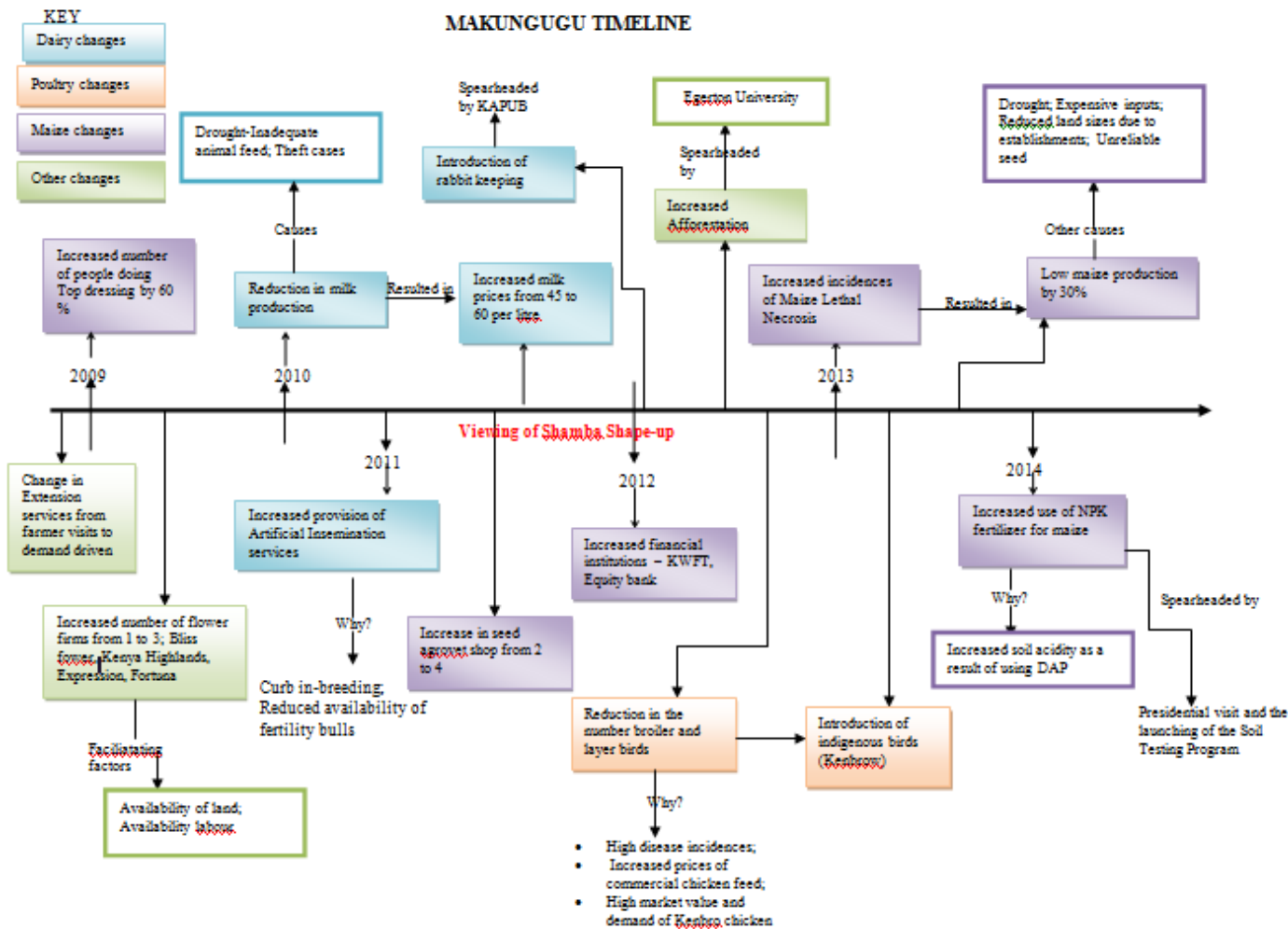


Figure 3.13: Timeline highlighting changes in Nakuru over the past five years

General trends across the two counties

The provision of agricultural extension services in the two counties has moved towards a 'demand driven approach' where only farmers who seek advisory services are able to access the public agricultural extension officers. This contrasts previous extension service models where extension agents made routine and ad-hoc visits to farmers. Extension services in both areas also use a group approach and farmers are encouraged to form groups so that they are able to access extension services regularly.

There were also major changes in agricultural commodity marketing in both counties. Previously, farmers used cooperatives to access markets; however, this has changed as other agents such as middle men, brokers and local market retailers had taken over during the past five or so years. For example in Muranga, cooperatives marketing agricultural commodities like milk, coffee and maize had collapsed and as a result, brokers and middlemen dominate the marketing of these products. In Kandara area of Muranga, brokers buy fresh milk from the farmers at prices as low as Ksh. 25 per litre, selling it on with large margins (Ksh 50 per litre) to companies such as Brookside and KCC. These issues with marketing have proved to be a deterrent for farmers wishing to venture into or intensify the dairy enterprise.

(b) Enterprise specific changes

Maize in Muranga

Maize is an important crop in Muranga and is mainly grown for subsistence purposes. Over the past five years the main changes have included the use of improved maize varieties. These tend to be either high yielding or early maturing varieties. Previously Kenya Seed, a state owned company, dominated the market for hybrid maize seed. However, there are now many seed companies including Pannar Seed, Western Seed and Faida Seed *inter alia*. The entry of multiple players into the seed system has provided farmers with greater choice. For example, at the beginning of each season, farmers make a choice of late, medium or early maturing varieties based on their perceived risk of unreliable rainfall and late season droughts. Farmers had developed their own criteria for choosing varieties to plant based on their experiences, some farmers preferring to grow PAN67 or PAN5243 from Pannar Seed in the short season because they considered it more prone to late season drought while H512 and H511 varieties from Kenya Seed were preferred in the main season as they were considered less prone to late season drought (TKMUR02)

In addition to the increased choice and use of new varieties, farmers recorded changes in the management of their maize crop. The majority of the respondents recorded that, in recent years, they had moved from broadcasting seeds to planting in rows, that they had started to combine artificial fertiliser with farmyard manure and to 'top-dress' their maize to increase production. This has been helped by the reduction in the cost of fertiliser following the re-introduction of government subsidies in 2013. Though investment in fertiliser has increased

farmers' expenditure, respondents were happy that the increased investment had increased yields.

Maize in Nakuru

In Nakuru, production of maize is mainly for commercial purposes. Respondents recorded that they were becoming increasingly aware of top dressing, minimum tillage and the application of foliar feed to increase maize productivity. Respondents also recorded that maize production in the area had generally dipped due to a number of challenges. These included increased incidences of a new disease in the area, referred to as Maize Lethal Necrosis¹¹, and increased soil acidity reportedly as a result of continuous use of DAP fertilizers. The land area under maize production has also gone down with the introduction of new enterprises (including commercial flowers) and changes in land use (for real estate development).

Dairy

Dairy is a popular enterprise in each of the two counties. In the five years preceding the PQR, dairy farming in the two counties had undergone considerable changes, impacting upon farmers both positively and negatively. These changes included: improved feeding (both types of feeds and feeding regime), housing and disease management (both control and treatment) and improved breeding practices. Previously, the majority of smallholder farmers have relied upon natural pastures within the homestead, communal grazing areas or areas along the roadside.

Among the actors seen to be important in the milk value chain /innovation system include the media through programmes on Radio and TV (such as SSU), the Ministry of Agriculture and Livestock, Agrovets, agricultural society of Kenya ASK¹ shows, private companies like Brookside, Ilara etc. SSU and other media houses had mostly influenced production related changes like improved herd health, feeds and feeding and farm structures. For a number of farmers using feed supplements and silage in both Muranga, and Nakuru there was a clear association with watching the SSU programme (see KII/MUR/10).

Dairy in Muranga

In Muranga an increasing number of farmers have changed from tethering or open grazing system towards stall feeding or zero grazing with Napier grass as the main fodder, while concentrates, cereal stovers and banana residues are used as supplements. These changes have been driven by increased pressure on land (TKMUR01, TKMUR02 and TKMUR03). Farmers have also changed the way that they prepare the feed for their cows, harvesting Napier grass during the rainy season to store and use in the dry season. This practice has had numerous benefits which include alleviating forage shortages in the dry season, cutting

¹¹A destructive viral disease characterized by chlorotic mottling of the leaves, usually starting from the base of the young leaves in the whorl and extending upwards toward the leaf tips

down on wastage and saving time spent looking for animal feeds. This meant that more time was available for carrying out other farm work, benefiting women more as they usually go out and gather the Napier grass for the cows. The process of making the silage is tedious and energy consuming so respondents spoke of coming together in groups in order to purchase chaff cutter machines to make the process easier and also cost effective.

Respondents reported that the improved feeding management had resulted in increased milk production. However, while farmers have been increasing their use of supplements, their production costs have increased considerably. As a way of coping with this change, respondents spoke of making adaptations, such as buying raw materials to make home-made feeds and using by-products of poultry (*mchungo*¹²) as a source of protein for their cows in addition to dairy meal (TKMUR01;SSU/CS/NKR/02). Farm structures, especially cow sheds, were better constructed and cleaner compared to the past when “*the animals slept in filthy conditions*”. In particular, some farmers who were not able to make paved floors for the cow sheds reported using sawdust or dry vegetation to provide better sleeping conditions for their cows.

Dairy in Nakuru

Nakuru County is one of the largest milk producing counties in the country. This is in part due to the presence of improved cattle breeds cross-bred with some of the original settler dairy cattle population. The area is conducive for large and small-scale dairying due to the existence of larger parcels of land compared to Muranga and agro-ecological conditions suitable for dairy farming. As mentioned, land sizes have been on the decline of the past five years (TKNKR01).

Negative effects from dairy changes

Though most changes that have occurred have been viewed positively, FGD participants highlighted some negative changes. An example was the provision of AI services. Previously the responsibility of Ministry of Agriculture officials, the service is now provided privately. Though the change in service provision has led to increased uptake of the services, most respondents believed that the quality of the services has been diminished. Low quality semen was viewed as being the reason for poor stock and had seriously affected milk productivity (TKMUR01, TKMUR02, TKNKR01 and TKNKR02). Changes in the marketing of milk were also considered to have had a negative effect. As dairy cooperatives no longer functioned, dairy farmers had been left in the hands of brokers and middlemen who bought milk at low prices (since 2012 prices of processed milk had gone up to an average of KES 50 per litre while the amount paid to farmers down from an average of KES 40 per litre to KES 30 in Nakuru and KES 25 in Muranga (TKMUR01 and TKNKR01)).

¹²Mchungo was term used to refer to poultry manure that farmers used as a ruminant protein supplement to feed livestock

Poultry

Rural poultry farming in both sites mostly involved rearing of local breeds in semi-intensive production systems for eggs and meat. It was established that a number of farmers had abandoned exotic breeds (particularly broiler farming) in favour of other breeds like Kenbro and the local breeds. The change was attributed to increased cost of feeds in the past two years (since 2012) and because the Kenbro birds mature faster than the indigenous birds (five months compared to eight months). The local breeds and Kenbro were preferred because they feed on locally available feeds such as milled maize, kales, sorghum, millet and grass; reducing the maintenance costs.

More women than men were found to be involved in Kenbro poultry enterprises in both Muranga and Nakuru. Farmers who had taken up the Kenbro enterprise had favourable views but noted that they were heavy feeders which was seen as a constraint. They noted that in the past year the cost of poultry feeds had gone up, making poultry farming expensive. For example a 70kg bag of growers mash cost \$9 one year ago and the same bag was now retailing at over \$16. Farmers had therefore developed coping strategies such as using homemade rations mixed with those purchased from established feed manufacturers.

Further, there were other changes mostly on improved management of local chicken breeds. These practices included better housing, disease control and management. Some of these practices were adapted from those used on commercial broilers and layers and included routine watering, vaccinations, supplementary feeding *inter alia*. With regard to housing, farmers constructed simple structures which they noted were better than those they previously used given that they were modified to have more lighting, laying nests etc. Farmers had also fabricated homemade feeders and drinkers.

Commercial broiler production was observed to be limited to very few farmers. Farmers were evidently interested in the enterprise but reported numerous constraints. For example, high start-up costs, high input costs especially commercial feeds. As a consequence, a number of broiler farmers were found to have abandoned the enterprise as they could not break even. It was however found that, a number of farmers were involved in indigenous poultry production albeit in small scales of less than 20 birds. Similarly, farmers who had made changes from the SSU programme had only adapted the practices and were involved in multipurpose, semi-intensive poultry production systems with improved management mostly involving local poultry (SSU/CS/NKR/02).

Actors and Connections

Farmers in Muranga and Nakuru use a range of different sources to acquire information. For example, at local level sources included: fellow farmers, local administrators (at public gatherings), agro-vets, women groups, hotels, private companies, local radio, lead farmers, extension officers and churches. Wider than this, at county and national level, information is

sourced from radio, TV, newspapers, county government representatives and, to a lesser degree, the internet.

The most common source of information for accessing agricultural information was the media, particularly local FM stations such as Innooro FM (in both Muranga and Nakuru), Coro FM (in Muranga) and Kass FM (in Nakuru). Television as a source of agricultural information was also well recognised. Amongst FGD participants forty per cent were viewers of SSU and saw the programme as a source of agricultural information.

Other main sources of information included formal and informal meetings, in church or at the chief's Baraza; observation of their peers and the practices that they were carrying out on their farms; and extension officers from government and private organisations. Extension officers addressed farmers in groups though some groups did not have regular meetings and so contact with extension officers was rare. In Muranga, there were a number of non-state extension service providers working in the area, including farm input distributors such as Tosha, Unga Feeds and Coopers *inter alia*. In general, agro-input suppliers and agro-vets had grown in numbers over the past five years. In the past few years access to financial services had improved, with a number of institutions (e.g. Co-operative Equity Bank, Faulu Kenya and Women Enterprise Fund) providing credit facilities

For agricultural information to be used in a productive way, it has to be timely, easily accessible and trusted. During the communication map activities, participants were asked to score various information sources for their accessibility, their trustworthiness and their timeliness (table 3.5 and table 3.6).

Table 3.5: Communication sources in Muranga scored by their accessibility, trustworthiness and timeliness (scale of 1-7 where 1 = very infrequent, very untrustworthy or always untimely and 7 = very frequent, very trustworthy or always timely)

Communication source	Regularity / how often accessed?	How trustworthy is the source?	How timely is the information received from the source?
Shamba shape up	6.5	7	6.5
Extension officers	3	4.5	3
Fellow farmers	4	1	5

The participants in Muranga focus groups scored SSU highly for accessibility, trustworthiness and timeliness (table 3.5), suggesting that they consider it to be a very useful source of information. In contrast, extension officers were seen to be trustworthy sources of information but were not considered to be accessible or timely in their provision of information. Fellow farmers were timely sources of information but the information they provide is considered to be very untrustworthy.

Table X: Communication sources in Nakuru scored by their accessibility, trustworthiness and timeliness (scale of 1-7 where 1 = very infrequent, very untrustworthy or always untimely and 7 = very frequent, very trustworthy or always timely)

Table 3.6 Communication sources in Nakuru scored by their accessibility, trustworthiness and timeliness (scale of 1-7 where 1 = very infrequent, very untrustworthy or always untimely and 7 = very frequent, very trustworthy or always timely)

Communication source	Regularity / how often accessed?	How trustworthy is the source?	How timely is the information received from the source?
Shamba Shape Up	6.3	6.7	5.7
Extension officers	2.7	5.7	3.0
Fellow farmers	4.7	3.7	5.3

In Nakuru (table 3.6), SSU scores positively for accessibility and timeliness and is seen to provide very trustworthy information for farmers. Extension officers, in comparison, are considered to be very trustworthy sources of information but are not accessible and so the information that they provide is not seen as being timely.

3.5.2 The effects of agricultural change

The households' that participated in the PB activities were practicing a mixture of the three selected enterprises: maize, dairy and poultry (broiler). Overall 72 PB activities were carried out, mainly with respondents who had reported being influenced by SSU but also, for comparison, with respondents who had stated that they had not been influenced by SSU. The sampling strategy for the PB activities was designed to allow three comparisons, the first of these is the before and after comparison in SSU influenced households; the second comparison is between SSU influenced households and non-influenced households and the third comparison is the differences made by on-farm changes influenced by SSU and not. In this section we will look at the first and third comparisons.

(a) Differences in SSU influenced maize farming households before and after change

There were 20 participatory budget activities with SSU influenced maize farmers. Ten of the households chosen were in Muranga and ten were in Nakuru. Prior to the change seven of ten households in Muranga were making a gross margin profit per acre and three were making a loss; the range per acre was from -\$536 to \$255; in Nakuru, all ten households were making a gross margin profit per acre, ranging between \$4 and \$871.

There were a range of practices influenced by SSU including mixing manure and fertiliser, purchasing inputs from a reputable dealer, purchasing certified seed, intercropping, top-dressing, using recommended spacing and using foliar feed. Following the changes, all of the households in both Muranga and Nakuru recorded a gross margin profit per acre, ranging from \$196 to \$673 in Muranga and from \$102 to \$1060 in Nakuru.

Table 3.7: Post-change gross margins for SSU influenced maize farmers (mean US\$ per acre)

	Cash inputs	Hired labour	Total costs	Consumed output	Sold output	Outputs	Gross margin
Muranga (n=10)	94.97	196.69	291.66	319.01	335.72	654.72	363.06
Nakuru (n=10)	83.25	99.04	182.29	196.75	425.25	622.00	439.71

Table 3.7 shows that the average gross margin is positive in both sites, with households in Nakuru recording a larger gross margin than those in Muranga. This difference appears to be largely due to increased input spending in Muranga, with households spending almost double their counterparts on hired labour.

The changes made by farmers in each district have made considerable differences to the gross margins of households in both sites. Differences in Muranga ranged from \$3.75 per acre to \$1051 per acre, whilst differences in Nakuru ranged between \$71 per acre and \$654 per acre. The average differences are highlighted in table 3.8.

Table 3.8: Mean difference in maize gross margins following SSU influenced change (US\$ per acre)

	Cash inputs	Hired labour	Total costs	Consumed output	Sold output	Outputs	Gross margin
Muranga (n=10)	41.70	47.21	88.91	181.45	177.28	358.73	269.82
Nakuru (n=10)	21.82	-4.10	17.72	15.57	192.87	208.44	190.72

The average gross margin per acre for the sample in Muranga has almost quadrupled following the SSU influenced change whilst in Nakuru the average gross margin has almost doubled. In Muranga the average spend on inputs increased by 44 per cent but the average output more than doubled resulting in the large increase in gross margins. In Nakuru, the majority of the extra produce that resulted from the change was sold (93%), whereas in Muranga slightly less than half (49%) of the extra produce was sold, the rest consumed. The results presented here suggest that SSU influenced changes are encouraging investment and increasing output and gross margins of farmers in both sites.

(b) Comparison of the differences made by SSU influenced changes in maize farming households and non SSU-influenced changes in maize farming

It is important to understand whether the changes made that are influenced by SSU make more of an impact than those influenced by other sources (as the two could be starting from very different bases). As established above, all twenty of those households that were influenced by SSU recorded an increase in gross margin profit per acre whereas of those fourteen households that were not influenced by SSU ten recorded increased gross margins following the change that they had made, two had seen no difference in gross margins and two had seen a negative impact on gross margins following the change.

Table 3.9: Comparison of mean differences in maize gross margins following SSU and non-SSU influenced change (\$US)

	Cash inputs	Hired labour	Total costs	Consumed output	Sold output	Outputs	Gross margin
SSU influenced households (n=20)	28.13	12.21	40.34	68.29	187.91	256.20	215.86
Non-SSU influenced households (n=14)	16.00	5.68	21.68	46.82	45.54	92.36	70.68

The changes that were made by both categories of household required increased inputs and, on average, the SSU influenced households increased their expenditure on inputs to a greater degree (table 3.9). They spend an extra \$28.13 (48%) on cash inputs and an extra 10 per cent on hired labour per acre as compared to those households not influenced by SSU who spend an extra \$16.00 (26%) on inputs and an extra 7 per cent on hired labour per acre.

With regards to outputs, the SSU influenced changes increased production to a greater degree when compared with non-SSU influenced changes. In terms of consumed output, SSU influenced changes increased the amount by 41 per cent compared to 25 per cent for non-SSU influenced changes. The comparison was even starker when sales are considered, SSU influenced changes increasing the income from sales by 90 per cent compared to an 18 per cent increase for non-SSU changes. This meant that overall; the SSU influenced change more than doubled the gross margin and the non-SSU influenced change increased average gross margins by 24%. These results suggest that, allowing for the small sample, the changes that are being influenced by SSU are proving to be more successful in improving production and gross margins per acre than those not influenced by SSU.

(c) What do these differences mean for maize farmers?

The above results indicate that SSU is encouraging positive change on the farm; increasing investment and increasing production. It is important to understand, from farmers, what these differences mean in real terms and results from the effects diagrams help to illustrate this. For example, a male farmer from Muranga (PB/MUR/M/08¹³) implemented three of the practices promoted by SSU (including top dressing and using certified seed). He does not sell the produce; however, the increased production has resulted in the household becoming food secure and saves the household money that used to be spent on food. This money is now available and is used for school fees, clothing and fuel. A female farmer in Nakuru (PB/NKR/M/11) was inspired to make several changes in her maize enterprise after watching SSU (applying manure after land preparation, top dressing using CAN, using actellic and inter-cropping maize and beans in different rows [she used to plant them in the same hole]). She has increased her yield by four 90kg bags to 18 bags; this has brought in an extra \$67 in sales and two extra bags for home consumption which gives her confidence that the family

¹³ Coding: PB = Participatory budget, MUR = Muranga, M = Maize, 08 = Number of exercise

has food for the whole year. She has also doubled her yield of beans now that they have been separated from the maize. Also in Nakuru, farmer PB/NKR/M/05 reported increasing his maize yield by almost half (from 25 to 35 90kg bags) which means that he will be able to sell almost ten bags at \$28 per bag (\$280). This increase came due to his use of top-dressing, implemented after seeing the idea on SSU. The money he makes from sales will be invested in his business (increasing his stock) and will also be used to buy inputs for the next season.

(d) Differences in SSU influenced dairy farming households before and after change

There were twelve participatory budget activities with SSU influenced dairy farmers, eight in Muranga and four in Nakuru. Prior to any changes seven of the eight households in Muranga were making a gross margin profit per cow and one had made a loss (range: -\$158.20 to \$373.48) and three of the four households in Nakuru were making a gross margin profit per cow (range -\$82.02 to \$1,697.53).

There were a range of practices influenced by SSU including improving feed, mixing own silage, chopping Napier grass, zero-grazing, feeding dairy meal, using supplements, increasing frequency of tick control and building a cow shed. Following the changes seven of the eight SSU influenced dairy farmers in Muranga recorded positive gross margins and one recorded a loss (though the loss was considerably smaller than before the change; range: -\$6.35 to \$738.43 per cow). In Nakuru, all four SSU influenced farmers recorded a positive gross margin following the SSU influenced change (range: \$36.85 to \$2032.81 per cow).

Table 3.10: Mean post-change gross margins for SSU influenced dairy farmers (US\$ per cow)

	Cash inputs	Hired labour	Professional costs	Total costs	Consumed output	Sold output	Outputs	Gross margin
Muranga (n=8)	293.62	56.18	10.83	360.63	163.12	532.58	695.70	335.07
Nakuru (n=4)	366.39	112.36	18.37	497.12	436.66	899.16	1335.82	838.69

Table 3.10 shows that average gross margins in both sites are positive. Households in Nakuru have increased their investment in cash inputs, hired labour and professional costs to a greater degree than those in Muranga following the SSU influenced changes. Output has also increased at both sites, by 49 per cent in Muranga and by 40 per cent in Nakuru.

Table 3.11: Mean difference in dairy gross margins following SSU influenced change (US\$ per cow)

	Cash inputs	Hired labour	Professional costs	Total costs	Consumed output	Sold output	Outputs	Gross margin
Muranga (n=8)	71.21	7.97	-3.06	76.12	27.98	199.38	227.35	151.24
Nakuru (n=4)	130.21	35.11	4.78	170.10	140.87	270.51	411.38	241.28

SSU influenced dairy farmers in Muranga have increased their gross margins by a larger proportion (82%) than their counterparts in Nakuru (40%) (table 3.11). Most of this increase

has come due to large increase in produce for sale (60%); produce for consumption increased by 21 per cent. Dairy farmers in Nakuru increased both their consumed output (48%) and their sale output (43%) by almost half following the SSU influenced change. The sample highlights the positive influence that SSU is having on these households, increasing gross margins per cow by a considerable margin.

(e) Comparison of the differences made by SSU influenced changes in dairy farming households and non SSU-influenced changes in dairy farming

As established above, eleven of twelve households that were influenced by SSU recorded an increase in gross margin profit per acre and one a small loss. Considering those dairy farming households that were not influenced by SSU, all seven recorded positive gross margins following the change they had made (range: \$237.24 to \$1724.72 per cow). When averages are compared. Non SSU influenced households' record larger gross margin profits (\$634.85) than SSU influenced households (\$469.37). The important comparison for this research however, is the difference that has been made by the specific change (table 3.12)

Table 3.12: Mean difference made by changes in dairy practice (US\$ per cow)

	Cash inputs	Hired labour	Professional costs	Total costs	Consumed output	Sold output	Outputs	Gross margin
SSU influenced households (n=12)	86.94	15.21	-0.97	101.18	58.08	218.34	276.43	175.25
Non-SSU influenced households (n=7)	43.15	0.00	0.96	44.11	11.35	110.82	122.16	78.05

The results in table 3.12 suggest that, despite the final gross margins, the SSU influenced changes made more of an impact on households than changes influenced by other sources. SSU influenced households increased their investment in cash inputs by 38 per cent and in hired labour by 27 per cent due to their changes whilst non-SSU influenced households increased cash inputs by 18 per cent and their investment in hired labour stayed the same. Alongside the increased investment that is encouraged, the SSU influenced households are, on average, increasing their overall output by 47 per cent compared to a 15 per cent increase in those that made changes not influenced by SSU. Consumed output is increased by a third (33%) and output for sale is increased by more than half (53%) as compared to 4 per cent increase in consumed output and 20 per cent increase in produce for sale in those households not influenced by SSU. This suggests that SSU influenced changes are helping those farmers that are starting from a lower base to 'catch up' their counterparts who may already be implementing the practices highlighted in the programme.

(f) What do these differences mean for dairy farmers?

In Nakuru, farmer PB/NKR/D/02 has built an improved cattle shed for his two Friesian cows, sourced better AI services and started to use dairy meal for his cows. These changes have been encouraged by SSU and have increased his overall milk yield by 50 per cent (from 12 litres per day to 18). The extra milk yield adds to that consumed in the home and the sale of milk supplements school fees for three of his children. The management changes have also improved the health of his livestock and treatment costs have reduced. The farmer described SSU as “phenomenal”. An example of a female farmer in Muranga was PB/MUR/D/14 who spoke of sharing the information that she receives from SSU with her women’s group. SSU encouraged her to increase the frequency of spraying for ticks and deworming, feed the cow dairy meal during the drying off period. These changes have resulted in a four-fold increase in milk yield (from 3 litres to 14 litres per day). The increased yield of milk has, firstly, boosted family health and the proceeds of sales have enabled her to boost her business. Another female farmer in Muranga (PB/MUR/D/23) is making an extra KSh18,800 from her two dairy cows due to changes she made encouraged by SSU. She is making her own silage based upon the recommendation of the programme. The increased income has helped her a lot and she is able to comfortably buy feeds for the cows, pay the workmen and purchase household items. Initially, she would have to find other sources of income to buy feeds and pay for workmen. She also used KSh5,000 as additional capital for the shop that she owns.

(g) Differences in SSU influenced poultry farming households before and after change

There were five participatory budget activities with SSU influenced small-scale poultry farmers (selling eggs and meat). Three of the households chosen were in Muranga and two were in Nakuru. In Muranga, prior to changes influenced by SSU, two of three households had made a gross margin profit per bird and one had made a loss (range: -\$1.75 to \$4.81). In Nakuru, both of the households were making a gross margin profit per bird (range: \$5.86 and \$8.43). The changes that were encouraged / influenced by SSU included improving feed, the use of disinfectant, improved housing, rearing Kenbro birds and using supplement feeds.

Following the changes, two of the three households in Muranga had made a gross margin profit per bird and one had made a loss; the range in gross margins per bird was from -\$1.07 to \$7.17. In Nakuru, both of the households were making a gross margin profit per bird, with a range between \$8.76 and \$9.68.

Table 3.13: Mean post-change gross margins for SSU influenced poultry farmers (US\$ per bird)

	Cash inputs	Professional costs	Total costs	Consumed output	Sold output	Outputs	Gross margin
Muranga (n=3)	10.90	0.13	11.03	3.16	11.51	14.67	3.64
Nakuru (n=2)	4.20	0.00	4.20	1.21	12.22	13.43	9.22

The average gross margins following the changes remain positive in both sites (table 3.13). The households in Muranga have increased their investment in cash inputs and professional costs to a greater degree than those in Nakuru following the changes they have introduced (table 3.14). Output has also increased at both sites, again more so in Muranga following increased investment.

Table 3.14: Mean difference in poultry gross margins following SSU influenced change (US\$ per bird)

	Cash inputs	Professional costs	Total costs	Consumed output	Sold output	Outputs	Gross margin
Muranga (n=3)	3.67	0.09	3.76	-0.07	5.47	5.40	1.64
Nakuru (n=2)	0.49	0.00	0.49	-0.15	2.72	2.57	2.08

The SSU influenced poultry farmers in Muranga have increased their gross margins per bird by a larger proportion (82%) than their counterparts in Nakuru (29%). Most of this increase has come due to large increase in produce for sale (90%) as produce for consumption in Muranga actually decreased slightly. Poultry farmers in Nakuru increased their sale output by 29 per cent following the SSU influenced change, however, again, their consumption per bird dropped slightly. In both cases, the increase in produce for sale came from increases in the volume of eggs produced as well as meat for sale (as more birds were making it to maturity); farmers also recorded recouping a higher price for the birds they sold.

(h) What do these differences mean for poultry farmers?

After watching the SSU episode on building a poultry house farmer PB/MUR/P/37 realised that building a poultry house would not be as expensive as he thought and so constructed one. He also changed the feed for his chickens to include layers and growers mash, following the advice on the programme. The benefit of the poultry house and the quality feeds has been an increase in the amount of manure that he is able to collect and use in his vegetable patch (the chickens used to wander around and so the manure was not concentrated). The loss of chickens and eggs due to predation and diseases is now a “thing of the past” and the number of eggs and mature birds has increased. He has made an extra \$42.70 in a five month period and the household has been able to consume more eggs and sometimes chicken, which he sees as having improved nutrition. This example shows how the farmer has taken an idea from SSU (housing and improved feeding for commercial broilers) and adapted it to his own situation (local poultry on a small scale). The farmer stated that he likes to get ideas from SSU because it is visual and the topics shown on the programme are practical and simple to implement.

(i) Gendered differences amongst maize farmers

It is important to understand the impact that SSU is having from a gendered perspective as farming practices affect women and men differently. Considering viewer SSU influenced

maize households twelve had women as their main decision maker and eight had men as their main decision maker.

Prior to the SSU influenced change male farmers were investing more in cash inputs (an extra 35%) but women were spending considerably more on hiring labour (38%) which means that on average, women spent more on their maize practices pre-change. Despite the larger spend by women; men were producing more output, on average, achieving \$52.98 (15%) more per acre. The majority of this difference is in consumed output as male farmers produced 40 per cent more for consumption than their female counterparts. Female farmers were producing marginally more for sale (2%).

The most popular changes made by men included use of top-dressing fertiliser, mixing manure and fertiliser and improving spacing; and for women the most popular changes included the use of specific improved varieties, either to increase productivity or for drought resistance. Following the changes made, the gross margins per acre for both men and women farmers are positive, with males recording larger gross margins than their female counterparts (table 3.15).

Table 3.15: Mean post-change gross margins for SSU influenced maize farmers split by gender (US\$ per acre)

	Cash inputs	Hired labour	Total costs	Consumed output	Sold output	Outputs	Gross margin
Men (n=8)	103.80	114.46	218.25	315.73	411.92	727.53	509.27
Women (n=12)	74.27	141.85	216.12	171.83	385.37	560.57	344.45

Men spend marginally more on inputs than women, investing more in cash inputs such as fertiliser, seed etc... and women spend more on hired labour. There is a large difference however in the output that is produced. Men produced almost double the amount for consumption per acre that women did and produced slightly more for sale also.

Table 3.16: Mean difference in maize gross margins following SSU influenced change split by gender (US\$ per acre)

	Cash inputs	Hired labour	Total costs	Consumed output	Sold output	Outputs	Gross margin
Men (n=8)	34.83	17.73	52.56	115.71	205.43	321.15	268.59
Women (n=12)	23.08	8.04	31.12	32.49	174.68	207.17	176.05

Table 3.16 shows that men who have made SSU influenced changes in their maize practice intensify their expenditure by a larger proportion than their female counterparts. They have increased spend on cash inputs by just over half (51%) and spend on hired labour by almost a fifth (18%). Women have increased their expenditure on cash inputs by almost half (45%) and on hired labour by six per cent. When outputs are considered, men increase their consumed output by considerably more than their female counterparts (58% compared to

23%) and double their output for sale whilst women increase their output for sale by 83 per cent. This suggests that both men and women maize farmers are benefiting considerably from their SSU influenced changes with men seeing marginally better results, possibly because of their capacity to invest more. However, this is a small sample size and further investigation would be required to test this suggestion.

(j) Gendered differences amongst dairy farmers

For dairy farmers, six SSU influenced changers were men and six were women. Prior to the SSU influenced change the male dairy farmers were faring considerably better than their female counterparts, with mean gross margins almost three and a half times larger (\$470.63 compared to \$140.01). Males were investing almost double the amount of females per cow (\$386.33 compared to \$217.21) and their outputs for both consumption (\$234.41 compared to \$128.92) and for sale (\$622.55 compared to \$228.31) far outstripped them.

The SSU influenced change has brought larger differences for the male dairy farmers, however, as a proportion of where the respective samples started from it is the female dairy farmers who have seen greater impact (table 3.17).

Table 3.17: Difference in dairy gross margins following SSU influenced change split by gender (US\$ per cow)

	Cash inputs (US\$)	Hired labour (US\$)	Professional costs (US\$)	Total costs (US\$)	Consumed output (US\$)	Sold output (US\$)	Outputs (US\$)	Gross margin (US\$)
Men (n=6)	83.40	31.94	-0.80	114.54	63.93	286.87	350.80	238.28
Women (n=6)	90.27	0.56	-1.13	89.71	53.10	158.77	211.87	122.17

Women have increased their investment in their dairy enterprise by 41 per cent compared to an increase of 30 per cent by men. Men's increase in outputs of \$350.80 is also larger than the women's average increase of \$211.87, however, as a proportion, the men only increased production by 41% whilst the women managed to improve production by 59 per cent. This leads to women dairy farmers almost doubling their overall gross margins due to the SSU influenced change and male dairy farmers increasing their gross margins by 50 per cent. Both men and women dairy farmers are clearly benefiting from their interaction with SSU influenced changes though SSU is helping women bridge some of the gross margin gap between them and male dairy farmers.

(k) Differences in maize farmers split by wealth

During the main survey all households were given a Progress out of Poverty Index (PPI) score. The median score for the whole sample was 61. For the purposes of splitting the participatory budget sample by wealth this median value was used. So those that recorded a PPI of 61 and above were classed as wealthy and those that recorded a PPI of less than 61

were classed as 'poorer'. Not all households in the participatory budget sample were included in the wealth comparison as they were not all involved in the main survey.

Prior to the SSU influenced change, the wealthier households were, unsurprisingly, investing more in their maize enterprise per acre (by 30%), with the difference coming from investment in hired labour. More surprisingly, however, the poorer households are producing ten per cent more per acre than their wealthier counterparts. The lower level of spending and increased produce leaves the poorer households with gross margins per acre that are almost double those of the wealthier households¹⁴.

When the figures are considered post-change (table 3.18), the wealthier households are able to invest more than their poorer counterparts, investing 65% more in their maize enterprise on average. This extra investment results in greater output (38%), mainly for household consumption (which is more than double that of poorer households) but also, marginally more output for sale (6%). Overall, gross margins for the wealthier households are 24 per cent larger than those for poorer households.

Table 3.18: Mean post-change gross margins for SSU influenced maize farmers (US\$ per acre) – split by wealth

	Cash inputs	Hired labour	Total costs	Consumed output	Sold output	Outputs	Gross margin
Wealthy (n=10)	99.57	196.06	295.63	297.47	416.25	713.72	418.09
Poorer (n=6)	87.35	92.15	179.51	126.44	391.43	517.87	338.36

The difference made by the SSU influenced change is shown in table 3.19. It is clear that the wealthier households have gained more from the SSU influenced change than the poorer households. Investment has increased by more than a third (39% compared to 10% in poorer households) and output produced has more than doubled (120% increase). Output for poorer households has also increased by almost half (45%) compared to output prior to the change. This means that wealthier households have increased their gross margins by almost three times their levels prior to the change and poorer households' have increased theirs by 75%, suggesting that the wealthier households are able to invest more into the changes that they make and are therefore able to take greater advantage of the benefits of those changes.

¹⁴ This may be because the gross margin calculations did not include family labour, which is likely to be relied upon to a greater extent in poorer households.

Table 3.19: Mean difference in maize gross margins following SSU influenced change (US\$ per acre) – by wealth

	Cash inputs	Hired labour	Total costs	Consumed output	Sold output	Outputs	Gross margin
Wealthy (n=10)	38.68	44.14	82.82	176.15	213.17	389.32	306.50
Poorer (n=6)	23.34	-7.59	15.76	-19.71	180.93	161.22	145.46

(l) Differences in dairy farmers split by wealth

From the sample of dairy farmers who stated that they had been influenced by SSU to make changes in their dairy enterprise seven were, based on their PPI score, wealthy and two were poorer. Wealthy dairy farmers were investing more prior to the change than their poorer counterparts (by \$32 [12%]), the difference being due to increased expenditure on hired labour. This increased expenditure led to greater outputs, with wealthier farmers producing an extra 19 per cent per cow (\$78.55). The majority of this output was sold, with wealthier farmers producing an extra \$124.02 (54%) of produce for sale. The poorer farmers actually produced more than their wealthier counterparts for consumption (by \$45.47 [34%]). This resulted in wealthier households recording gross margins that were almost a third larger (\$192.15 compared to \$145.73) than poorer farmers.

Following the SSU influenced change, the gross margins for both the wealthy and the poorer farmers are very similar. The wealthy farmers still record marginally higher expenditure on inputs (\$389.18 compared to 397.89 [2%]) due to spending on hired labour but the two poorer households are spending more on cash inputs per cow. The difference in outputs is similarly marginal, with the wealthy households achieving larger outputs (\$768.92 compared to \$742.42 [4%]), due to increased produce for sale. The two poorer households produce, on average, a third more (\$256.01 compared to \$189.85 [35%]) for consumption than the wealthier households.

The difference made by the SSU influenced change is shown in table 3.20. The two poorer households have increased their expenditure to a greater degree than their wealthier counterparts (45% compared to 32%) and their output has also increased to a greater degree (82% compared to 58%), with their output for sale doubling.

Table 3.20: Difference in dairy gross margins following SSU influenced change – by wealth (US\$ per cow)

	Cash inputs	Hired labour	Professional costs	Total costs	Consumed output	Sold output	Outputs	Gross margin
Wealthy (n=7)	88.29	9.74	-3.62	94.41	55.32	226.68	282.00	187.59
Poor (n=2)	110.51	0.00	6.74	117.25	76.01	258.03	334.04	216.80

This means that their increase in gross margins due to the SSU influenced change is proportionally larger than the wealthier households., suggesting that for the small sample of

dairy farmers, all have benefited from their changes but proportionally, the poorer households have benefited to a greater degree.

3.5.3 How has Shamba Shape Up helped to encourage these changes?

Where do farmers watch the programme?

It is clear from the FGD discussions that farmers are watching SSU in a variety of settings including the home, neighbours houses, village pubs and hotels. The majority of women watch SSU at home on Sundays after attending church services whilst men are more likely to watch away from the home in hotels or village pubs. Women spoke of watching the programme whilst they cook the family meal and men of watching the programme in a group and discussing the issues that it brings up.

As well as watching SSU, farmers discussed interacting with SSU through the SMS service, through reading brochures and also accessing information online. The reason for these interactions was that the programme had encouraged farmers to actively seek information. Further from these interactions, farmers went on to share this information with friends, neighbours and formal and semi-formal groups in which they were involved (CMMUR01, CMNKR01 and CMNKR02).

What do farmers do with the information they receive from the programme?

Farmers watching SSU are implementing the ideas in multiple ways: replicating technological changes, adapting technologies to suit their individual circumstances, becoming inspired to make other changes on their farm and forming plans for changes they can make in the future. Taking a specific focus group in Muranga as an example, of the seven farmers who had watched the programme, two had been encouraged to begin feeding their cows supplementary feeds, routinely spraying for ticks and de-worming their cows more regularly. The same farmers were using a combination of artificial fertiliser and farmyard manure to fertilise their maize farm. Other farmers were planning to start poultry units or strawberry farming based on ideas they had seen on SSU. In Njoro, Nakuru, farmers had organised themselves to source a new potato variety in bulk from another county after the variety was promoted in an episode of SSU; each farmer contributing money to purchase the seed.

Evidence was also found of influence from non-farming viewers of SSU. These viewers were sharing information with farming family members or friends on the phone and were also, in some cases, financially supporting their families to implement some of the ideas (SSU/CS/NRB/1; SSU/CS/NRB/2). For example, a University student based in Nairobi had seen an episode concentrating on the use of manure to control Striga weed and shared the information with his parents based in rural western Kenya. The parents implemented the practice and achieved a fifty per cent increase in their maize yield (SSU/CS/12).

What are the advantages of SSU as a source of information on farming?

Participants expressed favourable views towards SSU as a source of agricultural information. They believed that SSU provided information that was timely, practical and presented in a way that could be easily understood. The diversity of the enterprises featured on the programme meant that it accommodated different types of farming household and farmers particularly liked the way that the programme looked to take a 'whole farm' approach as it enabled them to compare their farming practices with host farmers and encouraged them to 'shape up' their own farms. The choice of host farmers was also seen as a strength of the programme as it was seen to be gender sensitive and viewers felt that the participation of male and female enabled a typical household dynamic to play out and be captured for the episode.

3.6 Attitudes towards Shamba Shape Up

This section is based on a number of statements included in the last section of the main survey that the participants were asked to evaluate. One set of statements was put to SSU viewers, covering: the impact of SSU on profit and household food situation; impact of SSU on viewers' decisions to make changes on their farms; views on other potential outcomes as a result of watching SSU, such as obtaining useful information; degree to which farmers identify with the problems shown; the discussion of the issues shown during the programme and whether the information is shared.

A second set of statements were evaluated by all respondents. These covered general views on farming; respondents' level of trust on different information sources; and respondents' level of use of information from different sources.

3.6.1 Perceptions and Views on Shamba Shape Up

Participants in the survey that were SSU viewers were asked to evaluate 23 statements related to the SSU TV programme. SSU viewers were asked to evaluate how much they agreed with each statement (1=strongly disagree; 5=strongly agree). Three out of the 23 statements referred to the impact that SSU programme may have had on their profit, food situation and on their decision to make changes to their farms.

Table 3.21 shows the distribution of responses to three statements related to outputs associated with watching SSU. The majority of SSU viewers believe that SSU has had a positive effect on their profit and their household food situation (71% for both). Those viewer SSU influenced respondents have a more positive view of the impacts (79% for both). This may be an indication that there may be positive impact associated with implementing the recommended practices. SSU viewers also think that watching SSU made them make

changes to their farm (69%). Again, those viewer SSU influenced respondents were more likely to make changes (74%)¹⁵.

Table 3.21: Distribution of responses to statements related to SSU viewers' perceptions and views on outputs of SSU TV programme

	1	2	3	4	5	Mean
I believe Shamba Shape-up has had a positive effect on my profit	1.0	12.3	15.6	46.4	24.7	3.81
<i>Viewer SSU influenced</i>	0.3	7.1	13.3	51.5	27.8	3.99 ^a
<i>Viewer non-influenced</i>	1.4	15.0	16.9	43.8	23.0	3.72 ^b
I think Shamba Shape-up has had a positive impact on my household food situation	1.6	11.8	16.0	45.5	25.1	3.81
<i>Viewer SSU influenced</i>	1.3	7.4	12.0	49.2	30.1	3.99 ^a
<i>Viewer non-influenced</i>	1.7	14.1	18.1	43.6	22.5	3.71 ^b
I have made changes to my farm because of watching Shamba shape-up	1.8	12.7	16.9	46.1	22.5	3.75
<i>Viewer SSU influenced</i>	1.3	8.7	15.5	43.0	31.4	3.94 ^a
<i>Viewer non-influenced</i>	2.0	14.8	17.5	47.7	17.9	3.65 ^b

Note: Percentage differences between groups were statistically tested for significant difference. Percentages followed by the same letters are not statistically different at 0.05 level. (n_{total}=896; n_{viewer SSU influenced}=309; n_{Viewer non-influenced}=587)

Figure 3.14 shows the average evaluation score for 3 statements related to outputs associated with watching SSU. This reflects what has been highlighted above (i.e. SSU viewers believe that SSU has had a positive effect on their profit and their household food situation; watching SSU made them make changes to their farm).

¹⁵ Please note that the group viewer non-influenced include farmers that produce maize and/or milk that do not attribute any of the practices in table 2.1 to SSU. However, they may have actually benefited from SSU if they produced other outputs for which they followed SSU advice.

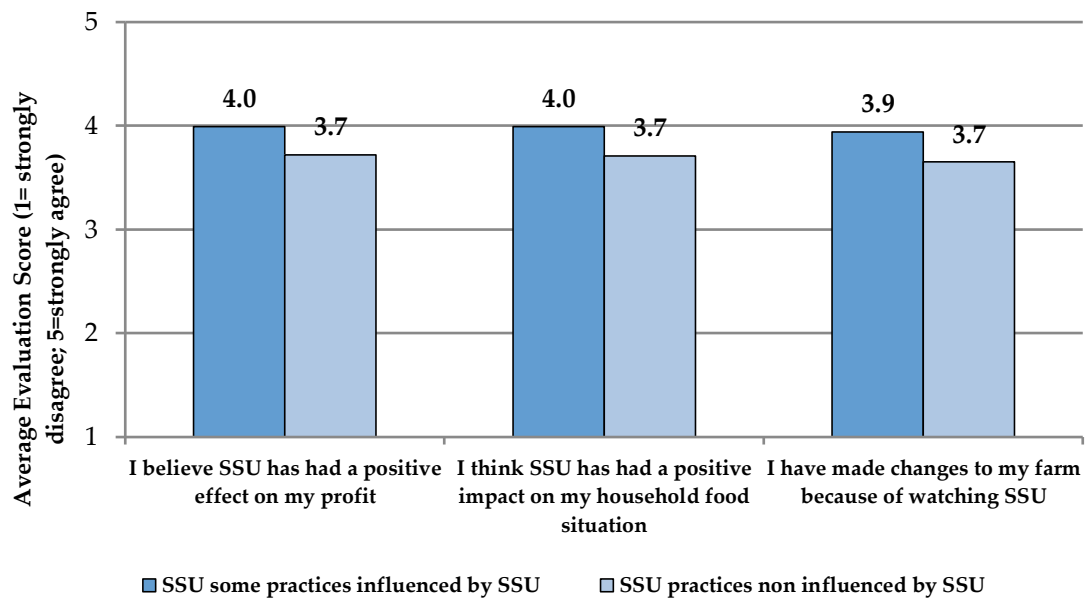


Figure 3.14: Average evaluation score to statements related to SSU viewers' perceptions and views on outputs of SSU TV programme by SSU group

Figure 3.15 shows that viewers watch SSU because they think they are going to obtain useful information from the programme (89%; 91% for those viewer SSU influenced respondents); they believe they learn new things about farming (88%); it gives them ideas which they try (83%; 89% for those viewer SSU influenced respondents); it helps them to make decisions (79%; 84% for those viewer SSU influenced respondents). Other reasons for watching the programme are that viewers think the programme is fun to watch (65%) and they like the presenters (38%).

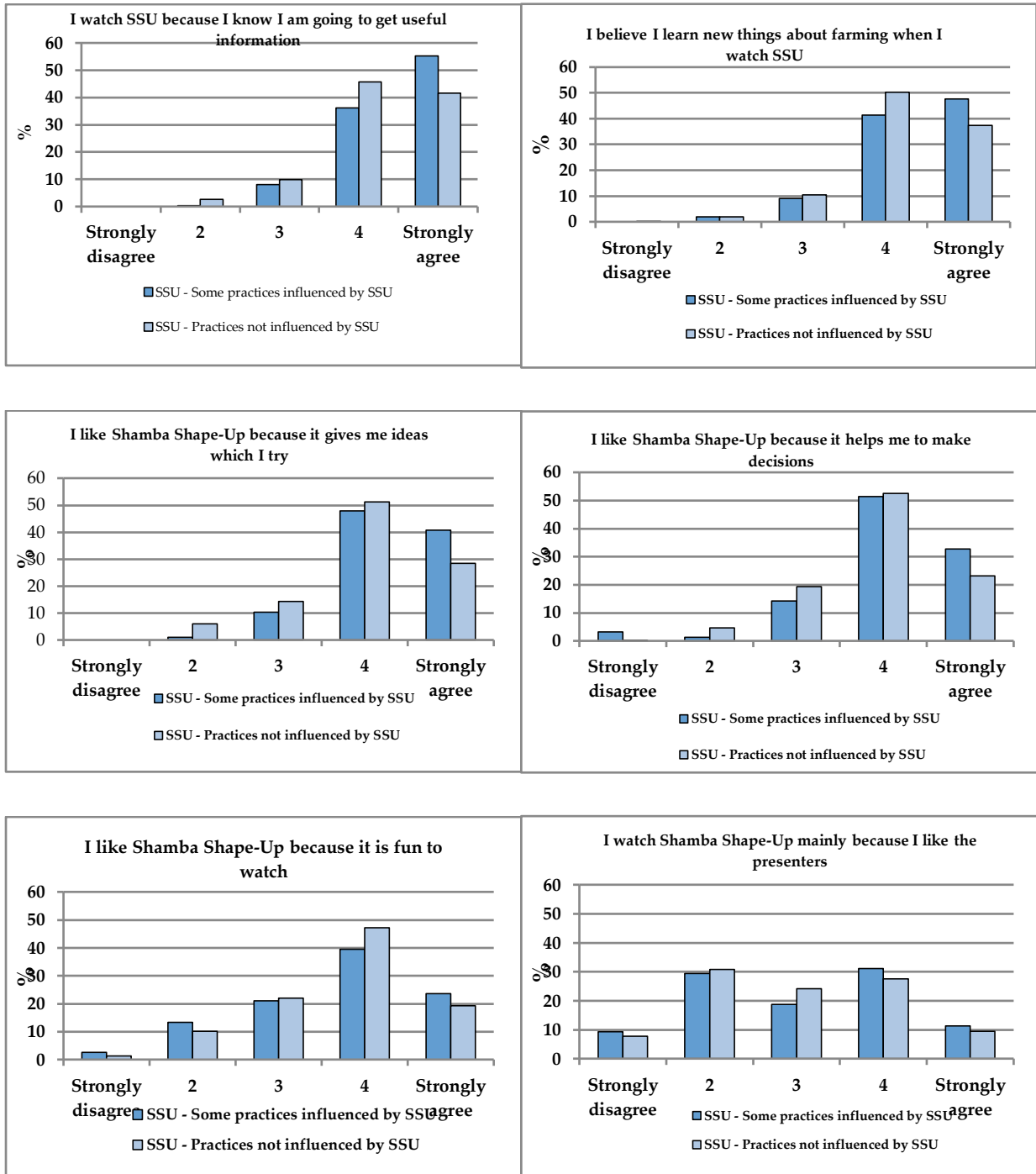


Figure 3.15: Distribution of responses of reasons for watching SSU by SSU group

Figure 3.16 shows the distribution of responses to statements related to SSU viewers' involvement with the programme. Over 70% of SSU viewers tend to identify with the problems farmers face in SSU, which indicates that the problems covered in the programme are relevant to farmers. Over two-thirds (67%) of SSU viewers care about the families shown in the SSU programme and more than half (55%) agree that they get emotional or involved when they see the problems farmers face with farmers reporting SSU influenced them to use some practices shown in the programme getting more emotional/involved. The majority of farmers (75%) think of other farmers when they watch SSU.

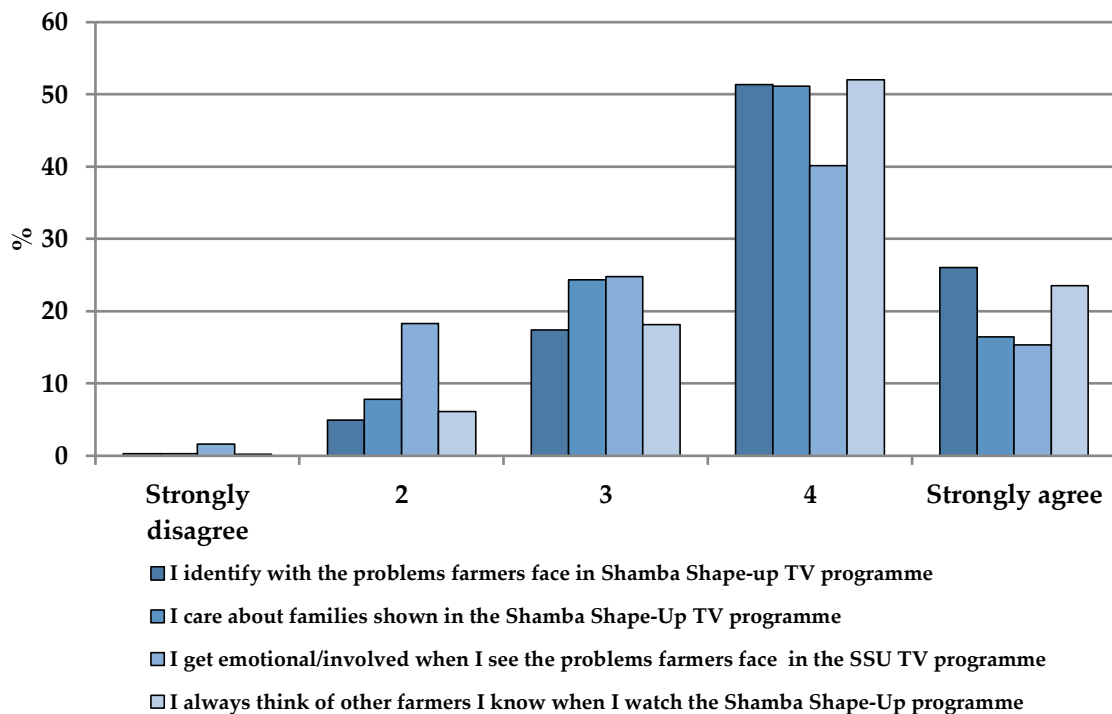


Figure 3.16: SSU viewers' involvement with the programme

Figure 3.17 shows the distributional responses to statements related to discussing information provided by SSU. The SSU programme is discussed within the family (60%; 69% for viewer SSU influenced respondents). Some viewers discuss the programme on the phone with family and friends (27%). The phone is used by 58% of viewers to text or call SSU to ask questions (64% for viewer SSU influenced respondents). The programme is discussed with other farmers (55%) and, to a lesser extent, with extension workers (26%; 30% for viewer SSU influenced respondents).

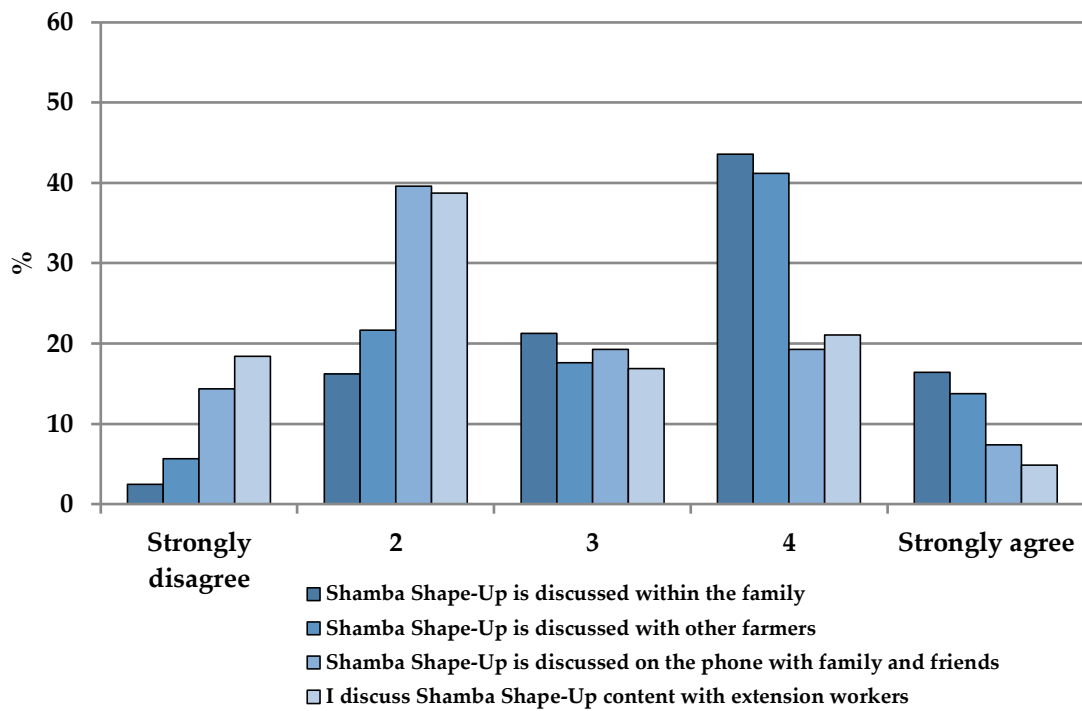


Figure 3.17: How SSU viewers discuss information provided by SSU

Figure 3.18 shows the distribution of responses to statements related to sharing information provided by SSU. Information shown in the programme is shared with others (68%; 74% for viewer SSU influenced respondents) and the programme is recommended to others (78%; 87% for viewer SSU influenced respondents).

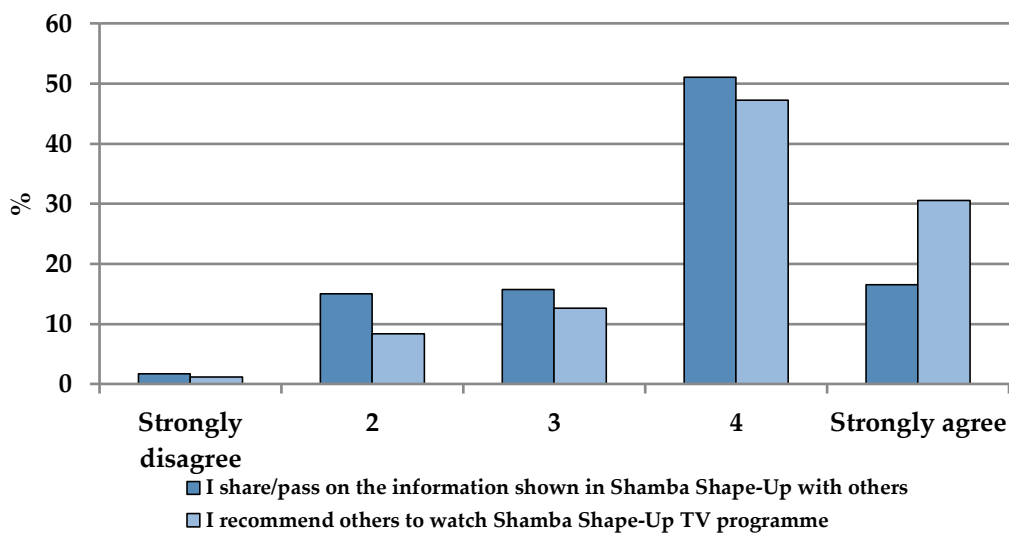


Figure 3.18: How SSU viewers share information provided by SSU

Viewers also like watching the programme with others in a public place (49%). Overall, SSU viewers agree that SSU makes them feel happy (78%; 87% for viewer SSU influenced respondents [figure 3.19]).

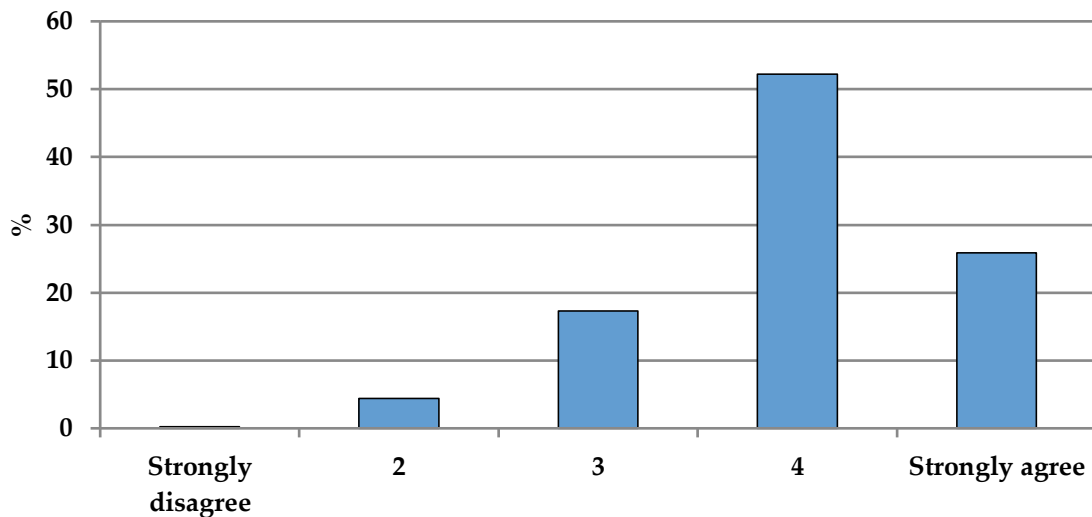


Figure 3.19: SSU makes me feel happy

3.6.2 General Perceptions and Views on Farming (all respondents)

Participants in the main survey were asked to evaluate 10 statements related to farming in general. Respondents were asked to evaluate how much they agreed with each statement (1=strongly disagree; 5=strongly agree).

Figure 3.20 shows the average scores given to statements related to general views on farming by viewership. A vast majority of farmers, SSU viewers (96%) and SSU non-viewers (92%), agreed or strongly agreed with the statement “I enjoy farming”. Farmers see farming as both a way to feed the household (95% of SSU viewers and 92% of SSU non-viewers) and as a business with SSU viewers agreeing more with the latter view (94% of SSU viewers and 85% of SSU non-viewers)¹⁶. Farmers like to try new things in their farms with SSU viewers being keener (83% of SSU viewers against 69% of SSU non-viewers) and the majority of farmers responded that they would use other inputs if they were cheaper (75% SSU viewers and 72% of SSU non-viewers). SSU non-viewers (52%) found more difficulties in sourcing materials and inputs needed to make changes than SSU viewers (47%). The level of scepticism about new technologies working is relatively high for both SSU viewers (44%) and SSU non-viewers (40%) with SSU viewers (35%) agreeing more with the statement “my supplier provides me with all information about inputs and material” than SSU non-viewers (24%). Results show that SSU viewers know better who to contact about inputs and materials, (44%) than SSU non-viewers (36%). Some farmers believe their farm is too small for them to care about making any changes (30% of SSU non-viewers and 26% of SSU viewers).

The majority of farmers reported that they would use other inputs if they were cheaper (73%) with viewer SSU influenced respondents agreeing slightly more to this (76%) than non-influenced (74%). Approximately half of the farmers agree or strongly agree that it is

¹⁶ See Table A.6.2 in Appendix for more details including statistical significance of differences between groups.

difficult to find materials and inputs needed to make changes and a relatively small proportion of respondents find that their suppliers provide them with all information about inputs and material (31%) they need. SSU viewers are more satisfied with the information provided by suppliers (41%).

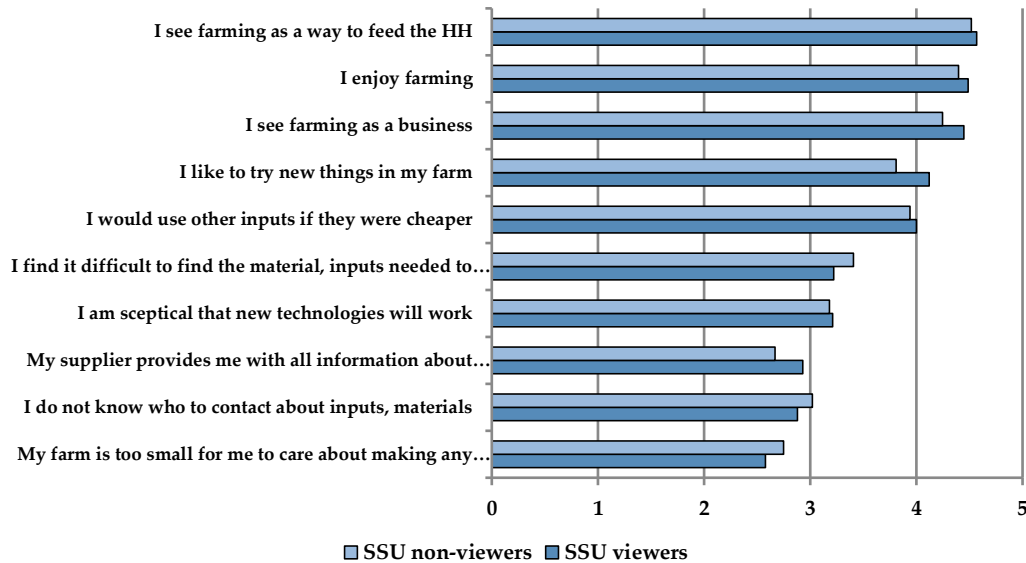


Figure 3.20: Average score to statements related to general views on farming (SSU viewers vs. non-viewers)

A cluster analysis (CA) was performed on the statements related to farmers' perceptions and views on farming in general. The aim of conducting this analysis is to group farmers into two distinct groups according to their general perceptions and views on farming. These groups will be used below in further statistical analysis when explaining how farmers change.

CA is a statistical method for identifying homogenous groups of objects called clusters. Therefore we use this method to form two groups/clusters of farmers according to their perceptions and views on farming. For this we use a partitioning method (more precisely, k-means)¹⁷. Two groups were identified (F1 and F2 –see Figure 3.21). Group F1 includes farmers who are relatively more positive about trying new things, enjoying farming, seeing farming as a business and as a way to feed the HH whereas group F2 is formed by farmers who tend to think more that their farm is too small to care about making changes; find relatively more difficulties in knowing who to contact about inputs and materials; and farmers who are relatively more sceptical that new technologies will work¹⁸.

¹⁷ See Table A.6.3 in Appendix for correlations between statements. Variables used in the cluster analysis are not highly correlated (<0.9) which would be problematic.

¹⁸ See Table A.6.4 for the cluster analysis results

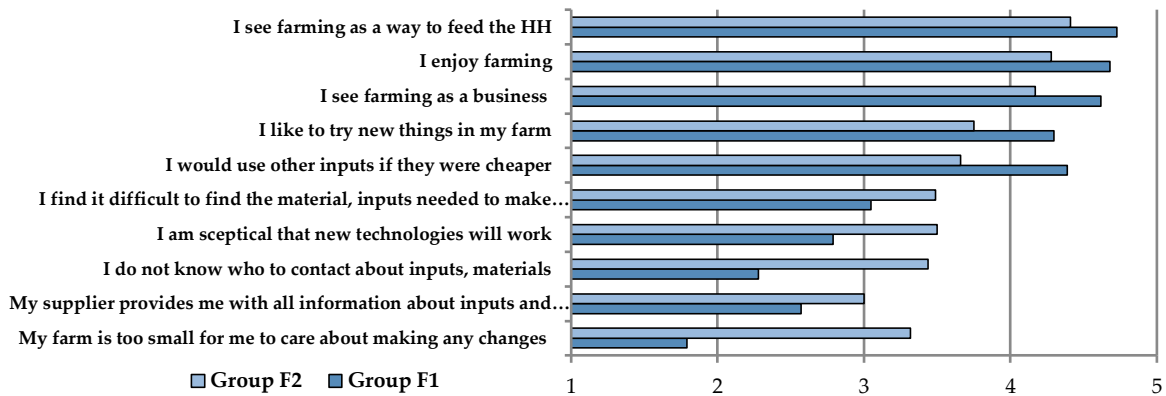


Figure 3.21: Average score to statements related to farming by cluster

3.6.3 Level of Trust in Sources of Information (all respondents)

Participants were asked about the level of trust in a number of sources of information (1 = I do not trust the information received from this source; 5 = I fully trust the information received from this source). Figure 3.22 shows the average score level of trust in sources of information for SSU viewers and non-viewers. There are relatively large differences between SSU viewers and SSU non viewers regarding their level of trust in sources of information apart from their level of trust in friends and family¹⁹. SSU viewers show higher levels of trust in sources of information than SSU non-viewers except for family and friends. SSU viewers top four sources in terms of level of trust are SSU TV programme (89%), friends or family (61%), radio (61%) and agri-vets (61%) whereas SSU non-viewers top four sources in terms of levels of trust are family and friends (64%), radio (57%), agri-vets (47%) and agro dealer shopkeeper (44%).

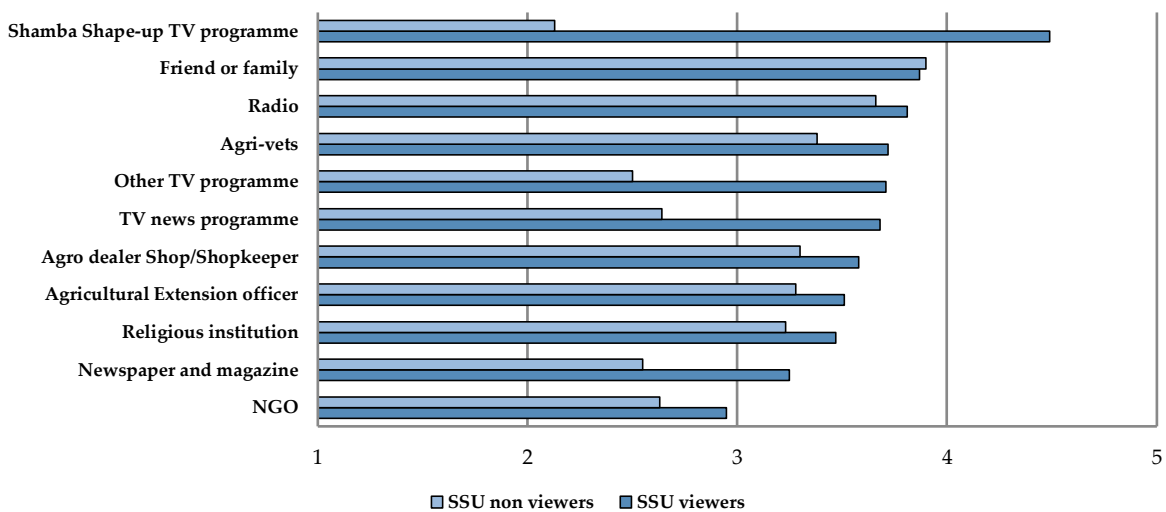


Figure 3.22: Average score of level of trust in sources of information (SSU viewers vs. non-viewers)

¹⁹ See Table A.6.5 in Appendix for more details including statistical significance of differences between groups.

3.6.4 Level of Use of Information by Source of Information (all respondents)

Participants were asked about the level of use of information from a number of sources of information (1 = I do not use the information received from this source; 5 = I fully use the information received from this source). Figure 3.23 shows the average score level of use by source of information for SSU viewers and non-viewers. There are relatively large differences between SSU viewers and SSU non viewers regarding their level of use of information from sources of information apart from their level of use on radio²⁰. SSU viewers show higher levels of use of information on sources of information than SSU non-viewers except for information from family or friends. SSU viewers top four sources in terms of the average score of level of use are SSU TV programme (77%), friends or family (59%), agri-vets (53%) and agro dealer/shopkeeper (51%) whereas SSU non-viewers top four sources in terms of levels of use are friend or family (64%), radio (43%), agro dealer shopkeeper (36%) and agri-vets (37%).

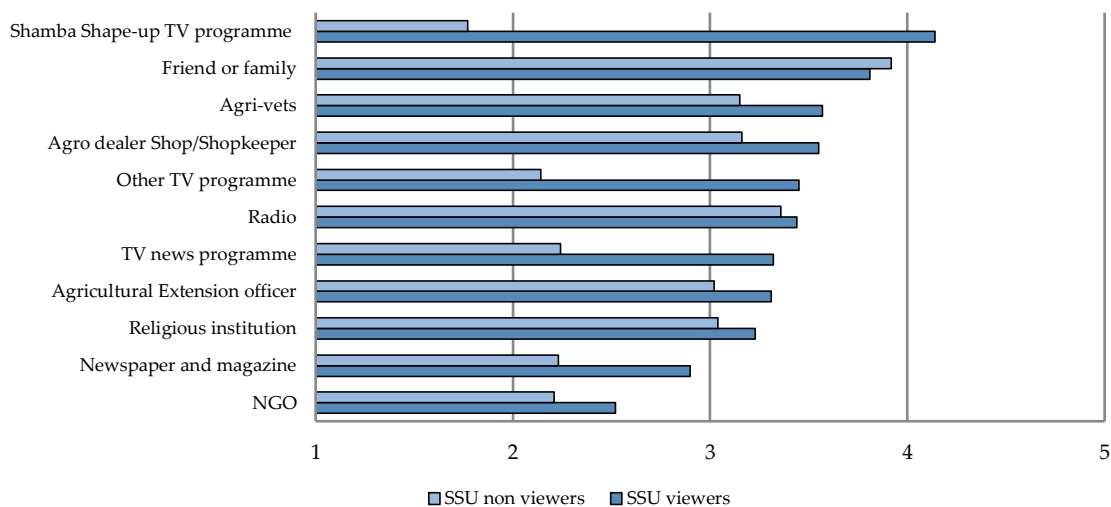


Figure 3.23: Average score of level of use of information by source of information (SSU viewers vs. non-viewers)

3.6.5 Perceptions on How Things Have Changed In the Last Two Years

All participants were asked to evaluate 10 statements about how things may have changed for them in the last two years (1 = I strongly disagree; 5 = I strongly agree). Hence, we measure the perceptions of change since the start of SSU programming²¹ on 10 aspects including level of confidence to implement new things and achieve aims; change of one's social status; household level of food security; diversification of farm output; farm management changes leading to less risk; changes in the level of knowledge in training; community's level of welfare; and feeling better off in general. These statements were given to SSU viewers and SSU non-viewers. Figure 3.24 summarises the results for all respondents.

²⁰ See Table A.6.6 in Appendix for more details including statistical significance of differences between groups.

²¹ The first season of SSU aired approximately two years before the survey

Non parametric statistical tests (more precisely, Kruskal Wallis non parametric test) were carried out to compare SSU viewers and non SSU viewers²². Results suggest that SSU viewers’ perceptions are statistically significantly different to SSU non viewers. Thus, 78% of SSU viewers agree or strongly agree with the statement that they are better off now than two years ago compared to 58% of SSU non-viewers agreeing or strongly agreeing with the statement. Also 78% of SSU viewers believe (i.e. either agree or strongly agree) that they feel more confident to achieve future aims compared to 57% of SSU non-viewers believing this. In terms of food security, 70% of SSU viewers think (i.e. either agree or strongly agree) their household is more food secured now than in 2012 whereas only 52% of SSU non viewers think the same. Equally, 70% of SSU viewers believe (i.e. either agree or strongly agree) their knowledge on trading has improved since 2012 whereas only 48% of SSU non viewers think the same²³.

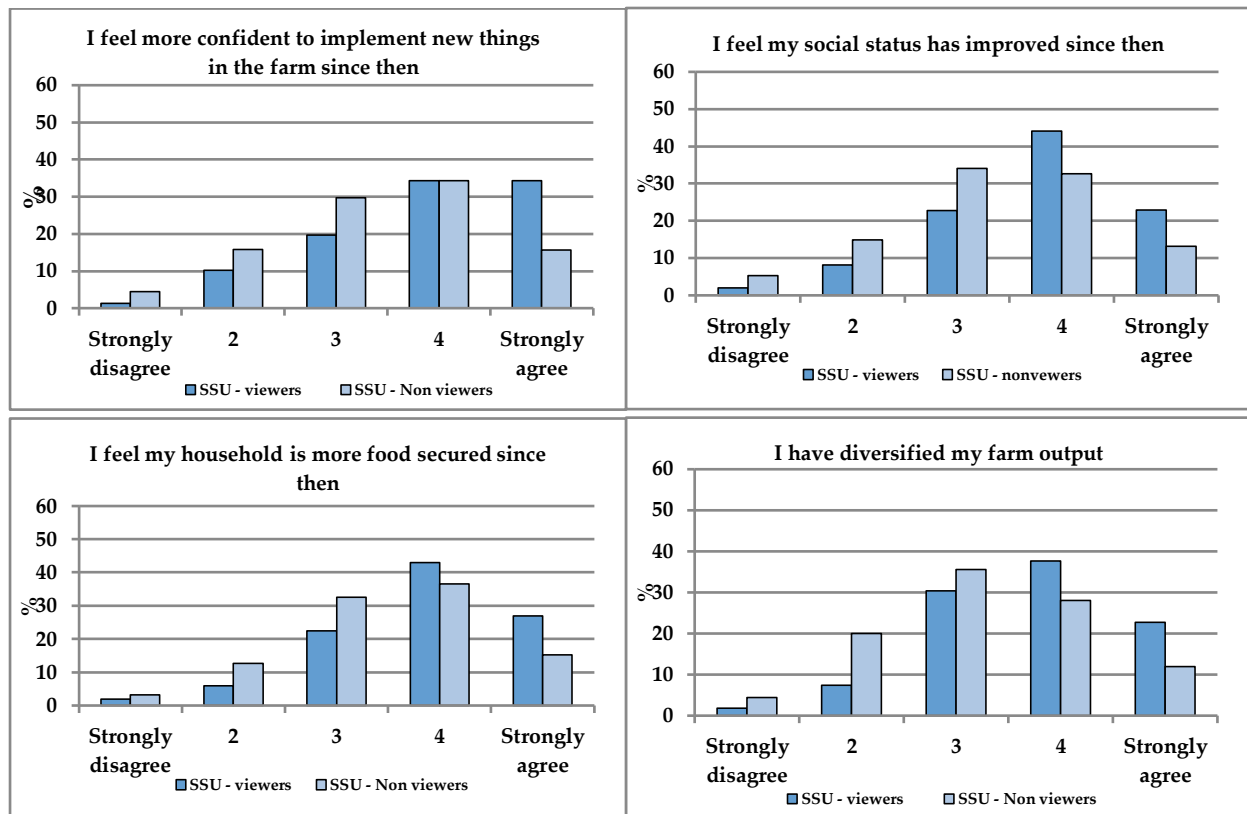


Figure 3.24: Distribution of responses of farmers’ perceptions about how things have changed in the last two years for them

²² See table A6.6 in Appendix for further information.

²³ See table A6.6 in Appendix for further information.

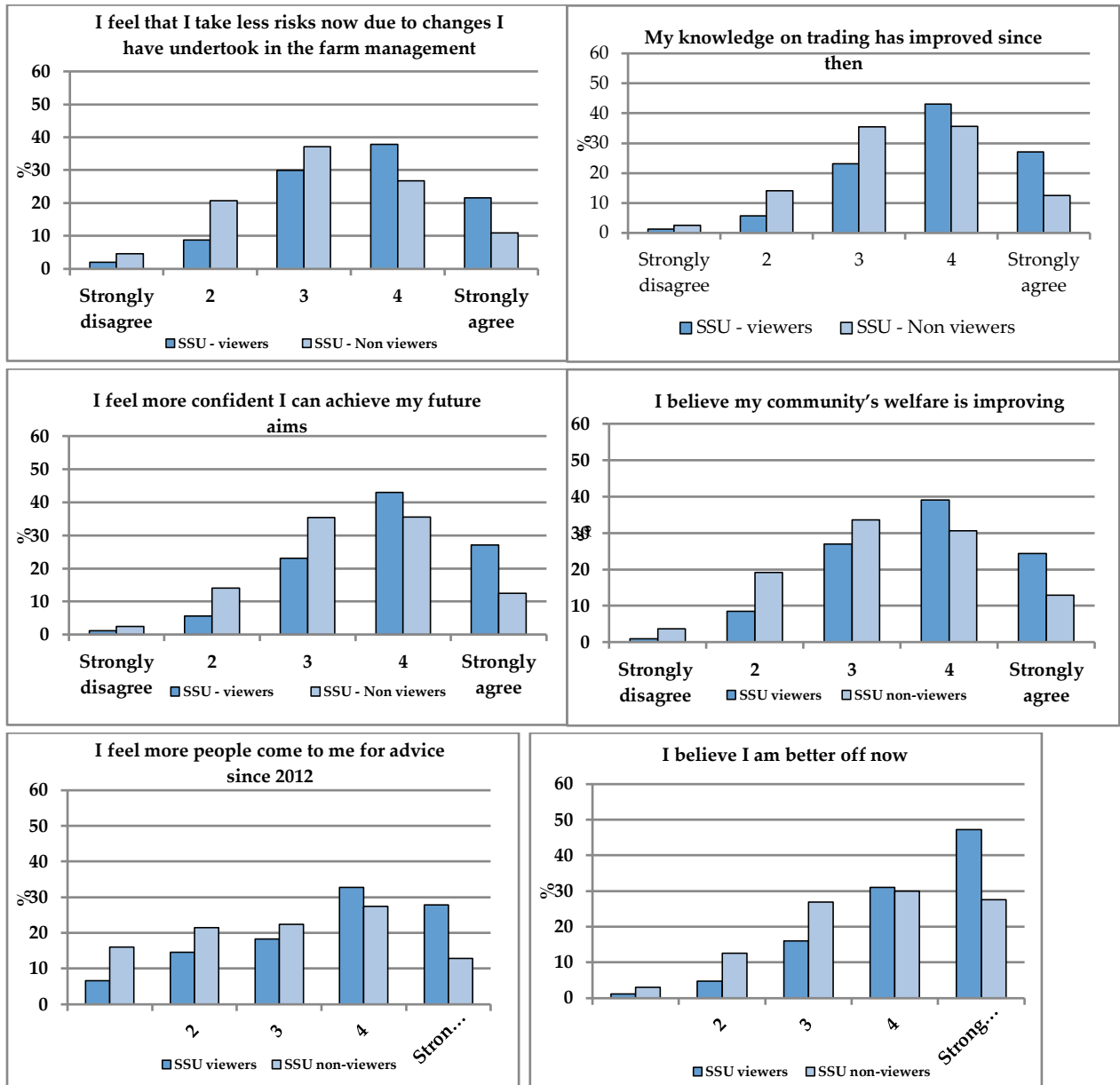


Figure 3.24: Distribution of responses of farmers' perceptions about how things have changed in the last two years for them (continued)

Differences in perception on how things have changed in the last two years between SSU viewers and SSU non-viewers may be due to differences in farmers' level of education as well as differences in farmers' level of income. In order to control for such differences in education and income we grouped respondents according to their level of education (higher or lower) and PPI score (higher or lower) into similar groups for comparison (see table 3.22)²⁴. We formed 8 groups (i.e. 4 pairs of comparable groups; group 1 vs. group 5, group 2 vs. group 6 and so on).

²⁴ Relatively higher and lower level of education and PPI levels were defined by the median of the sample.

Table 3.22: Groups according to SSU viewership, education and income

SSU Viewers		SSU non Viewers	
Group 1 (n=201)	Lower education and lower PPI	Group 5 (n=344)	Lower education and lower PPI
Group 2 (n=154)	Lower education and higher PPI	Group 6 (n=87)	Lower education and higher PPI
Group 3 (n=118)	Higher education and lower PPI	Group 7 (n=127)	Higher education and lower PPI
Group 4 (n=392)	Higher education and higher PPI	Group 8 (n=94)	Higher education and higher PPI

Figure 3.25 shows average scores for each of the 10 statements related to farmers’ perceptions on how things may have changed since 2012 by groups of level of education and income and SSU viewership. For the lower educated with lower PPI group, scores given by SSU viewers to the statements are statistically significantly greater than scores given by SSU non-viewers (p-value < 0.05)²⁵. For the lower educated with higher PPI group scores given by SSU viewers are also statistically significantly greater than scores given by SSU non-viewers (p-value < 0.10)²⁶. For the higher educated and lower PPI group scores given by SSU viewers to the statements are statistically significantly greater than scores given by SSU non-viewers (p-value < 0.05) whereas for the higher educated and higher PPI scores given by SSU viewers are also statistically significantly greater than scores given by SSU non-viewers (p-value < 0.10).

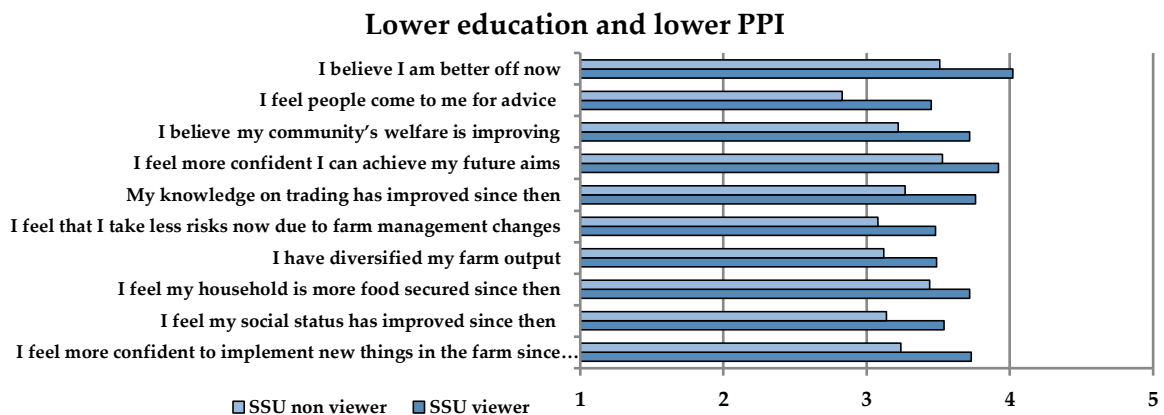


Figure 3.25: Average score of level of farmers’ perceptions about how things have changed in the last two years for them by level of education, PPI and SSU viewership

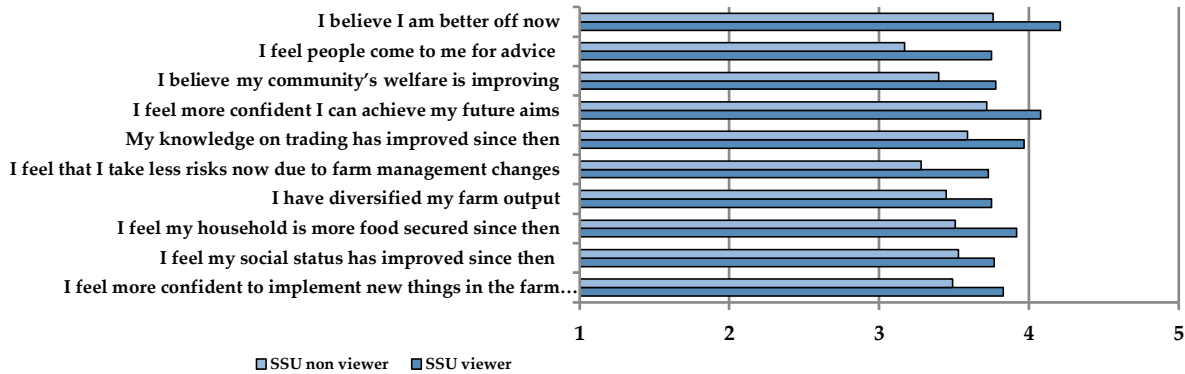
²⁵ Kruskal Wallis non-parametric test.

²⁶ All statements are statistically significant at 5% significance level except for “I feel my social status has improved since then”; “I feel more confident I can achieve my future aims”; and “I believe my community’s welfare is improving” which are statistically significant at 10% significance level.

Lower education and higher PPI



Higher education and lower PPI



Higher education and higher PPI

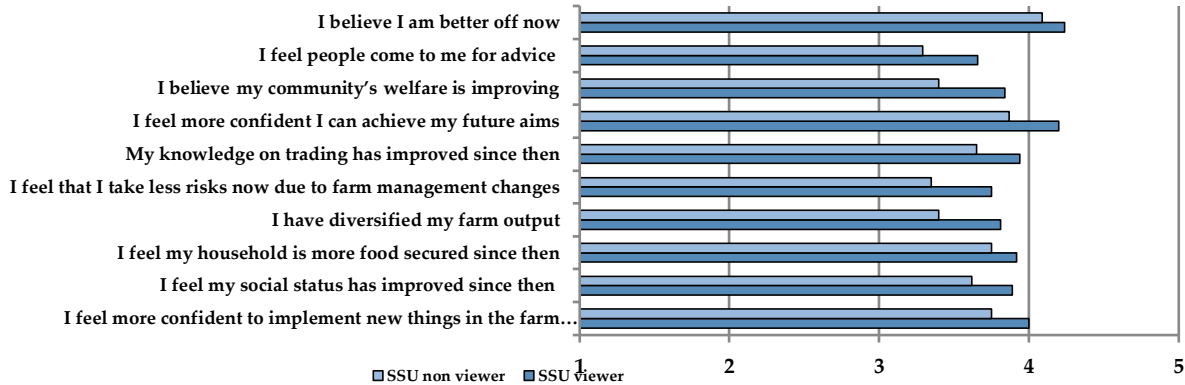


Figure 3.25: Average score of level of farmers' perceptions about how things have changed in the last two years for them by level of education, PPI and SSU viewership (continued)

Also scores given by respondents (SSU viewers and SSU non-viewers) generally tend to increase as level of education and PPI increases. Finally, we conclude that SSU viewers, regardless of the level of education and PPI tend to have a more positive perception about how things have changed since the start of SSU TV programme in 2012 than SSU non-viewers.

3.6.6 Explaining Change

We use the theory of change as a framework to analyse a number of potential drivers on farmer's decisions to apply agricultural practices shown in the SSU TV programme. These are practices shown in table 2.1 for maize and dairy enterprises. The decision to implement/apply/change practices during the last 12 months (dairy); and during the last season (maize) is investigated within the conceptual framework depicted in figure 3.26.

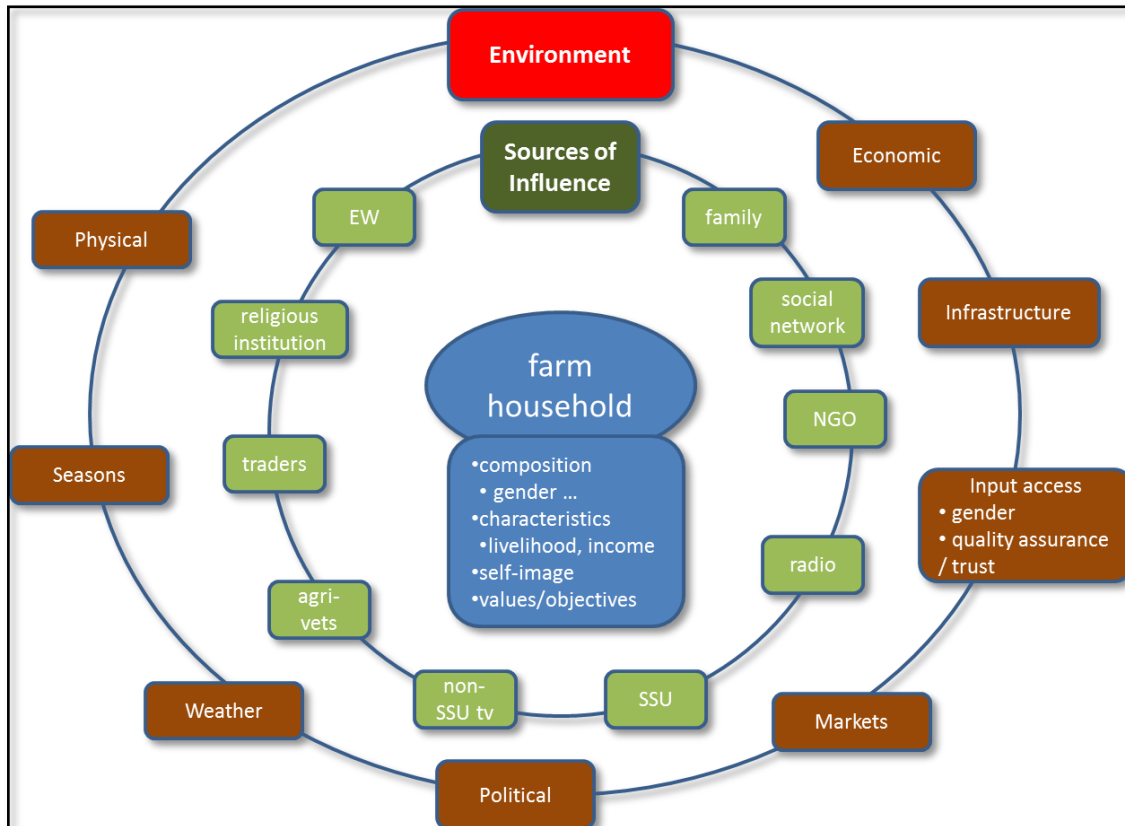


Figure 3.26: Conceptualisation of the elements influencing change

We use/interpret change as implementing a relatively large number of practices during the last 12 months/season. Hence, we classify farmers into those that are above or below the median of number of practices implemented during the last 12 months/season²⁷. Figure 3.26 shows three main levels at which elements may influence change: elements at the farm household (e.g. farmer's values, perceptions, composition of the household), sources of influence (e.g. family and friends, traders, SSU) and the environment (e.g. political and economic aspects). Environmental aspects are non-observable since this study is a snapshot of the situation and their effect on change is not investigated here.

²⁷ The median values for number of practices implemented for maize and dairy farmers are 3 and 4 respectively. Therefore two variables were created: changes maize taking a value of 1 if the number of changes is greater than 3 and takes a value of 0 otherwise and changes dairy which takes a value of 1 if the number of practices implemented is greater than 4 and takes a value of 0 otherwise.

Change (i.e. the probability of implementing a relatively large number of practices) is explained through a number of explanatory variables that account for farmer characteristics, household characteristics, farmers' general views on farming, their level of trust in sources of influence of change and a dummy variable for SSU viewership. Farmer characteristics included in the model are: gender, age and level of education. Farmer's level of education is taken into account using dummy variables (no formal education, primary education, secondary education, college after secondary and university). Farmer income, measured through PPI, is included in the model using three dummy variables: low PPI that takes a value of 1 if their PPI score is lower than 40 and 0 otherwise; normal PPI takes a value of 1 if their PPI score is between 40 and 69 and takes a value of 0 otherwise; high PPI takes a value of 1 if their PPI is greater than 70 and 0 otherwise. Household characteristics include the household female ratio (number of adult women divided by total number of adults in the household), household children ratio (number of children in the household divided by the total number of members in the household), household income is captured by the PPI indicator. Farmer's general views and attitudes towards farming are incorporated into the model using the clusters F1 and F2²⁸. We use a dummy variable that takes a value of 1 if the farmer is classified as belonging to cluster F1 and takes a value of 0 otherwise.

The analysis of the sources of influence on change is focused on level of trust in sources of information. We asked farmers to evaluate their level of trust in sources of information such as: radio, family and friends, agricultural extension officers, non-governmental organisations, TV news programmes, SSU TV programme, other farming programmes, newspapers-magazines, agro-dealers/shopkeepers, agro-vets and religious institutions. We conducted a factor analysis (principal component analysis) to group sources of information into relatively small common themes²⁹. These themes were incorporated in the model as explanatory variables. Factors were extracted for eigenvalues greater than one and varimax rotation was adopted, which guarantees that the obtained factors are orthogonal reducing the risk of multicollinearity in the probit models. A four factor solution was adopted which explains 67.8% of the total variance on the level of trust on sources of information. Table 3.23 shows the factor loadings obtained for the rotated component matrices. The first factor (Media_trust) is associated with trust in sources related to general media (i.e. TV news programme, other TV programme on agricultural issues, newspapers/magazines); the second factor (External1_trust) is associated with trust in sources of information that involve the farmer usually contacting these sources (agro-dealers/shopkeepers, agri-vets); the third

²⁸ F1 cluster included farmers who are relatively more positive about trying new things, enjoying farming, seeing farming as a business and a way to feed the HH whereas group F2 is formed by farmers who tend to think more that their farm is too small to care about making changes; find relatively more difficulties in knowing who to contact about inputs and / or materials; and farmers who are relatively more sceptical that new technologies will work.

²⁹ The Kaiser-Meyer-Olkin measure of sampling adequacy (Kaiser, 1970) was 0.80 indicating the convenience of conducting factor analysis.

component (External2_trust) is associated with trust on sources of information that usually come to the farm to provide advice (agricultural extension officers and NGOs) whereas the fourth component (Traditional_trust) is associated with trust on traditional sources of information such as radio and friends and family.

Table 3.23: Factor loadings for level of trust on information sources

	Factor 1	Factor 2	Factor 3	Factor 4
TV news programme	0.82			
Other TV programme	0.83			
Newspaper/magazine	0.70			
Agro-dealers/shopkeeper		0.87		
Agrivet		0.84		
Agricultural extension officer			0.76	
NGO			0.64	
Religious Institution			-0.47	
Friends or family				0.90
Radio				0.46

All explanatory variables in the model are treated as exogenous variables except for SSU viewership which is treated as endogenous for the following reason. Since our aim is to study whether watching SSU leads to change (i.e. increasing likelihood of implementing a greater number of practices) we are concerned that the explanatory variable SSU viewership may be correlated with other factors that can affect change. In order to control for this form of endogeneity we use TV works as an instrumental variable that explains SSU viewership. TV works is a dummy variable that takes a value of 1 if the household has a TV set that is in working condition and takes a value of 0 otherwise. We use Hausman test (Hausman, 1978) to test for endogeneity in the models. We found evidence of endogeneity only for the dairy model and therefore estimate a probit model with instrumental variables. Descriptive statistics of all variables used are shown in table 3.24.

Table 3.24: Descriptive statistics for maize and dairy change models

	Maize (n=1,438)		Dairy (n=806)	
	Mean	Std. Dev	Mean	Std. Dev
High number practices	0.519	0.500	0.401	0.490
SSU viewers	0.566	0.496	0.586	0.493
Farmer's age	43.338	14.415	45.897	14.722
Gender	0.509	0.500	0.540	0.499
No formal education	0.056	0.231	0.065	0.246
Primary education	0.464	0.499	0.447	0.497
Secondary education	0.331	0.471	0.340	0.474
College after secondary/University	0.149	0.356	0.149	0.356
HH female ratio	0.515	0.208	0.513	0.198
HH children ratio	0.413	0.231	0.398	0.234
Total land area	2.955	6.941	3.986	9.099
Low PPI	0.141	0.348	0.118	0.323
Normal PPI	0.584	0.493	0.600	0.490
High PPI	0.275	0.447	0.282	0.450
Cluster F1	0.437	0.496	0.433	0.496
Media_trust	4.892	1.912	4.895	1.912
External1_trust	4.906	1.896	5.069	1.860
External2_trust	4.895	1.907	4.975	1.815
Traditional_trust	4.908	1.881	5.023	1.931
TV works	0.604	0.489	0.656	0.475

Two models were estimated, one for maize and another for dairy. Since our dependent variables, maize and dairy changes are binary and we want to control for endogeneity problems associated with SSU viewership we estimate the models using probit models with instrumental variables. Results show that SSU viewers are more likely to apply a relatively large number of practices compared to farmers that do not see the TV programme conditional on other regressors included in the model (see table 3.25). This result was found for both maize and dairy farmers with a higher impact for dairy farmers. Hence, results suggest that SSU viewership leads to change (as interpreted here –i.e.– a relatively large number of practices are applied). Regarding a farmer's characteristics, their highest level of education was found to be an important factor determining change. More educated farmers are more likely to apply a relatively high number of practices. Age was also found to be a significant factor, with older farmers applying relatively higher number of practices than younger farmers. No significant differences in number of practices applied were found in terms of gender. Regarding household characteristics studied, HH income level was found to lead to change (i.e. a relatively high number of practices). HH female ratio and HH children ratio had no significant impact on the probability of applying relatively high numbers of practices. Total land area was only found to be a significant factor for dairy farmers. The bigger the total farm area the less likely it is that farmers will apply a large number of practices.

Farmers' general views on farming were found to be an important factor leading to change, particularly for dairy farmers. Those farmers who are relatively more positive about trying new things, enjoying farming, seeing farming as a business and a way to feed their family were found to be more likely to implement more practices than those who tend to think more that their farm is too small to care about making changes; find relatively more difficulties in knowing who to contact about inputs and materials; farmers who are relatively more sceptical that new technologies will work. Finally, the level of trust on sources of income was found to have some influence on change. For maize farmers it was found that the higher the level of trust is in traditional sources (mainly friends and family) the less likely it is that farmers will implement a relatively large number of practices. On the other hand, for dairy farmers the more trust farmers have in sources of information that come to the farm to provide advice such, as agricultural extension officers and NGOs, the more likely is that farmers will apply a large number of practices.

Table 3.25: Determinants of farmer's applying a relatively large number of practices

	Maize		Dairy	
	Coeff.	z-statistic	Coeff.	z-statistic
Constant	-0.632**	-2.01	-2.646***	-5.40
SSU viewers	0.156*	1.95	0.804***	3.25
Farmer's Age	0.005*	1.81	0.011***	2.95
Gender	0.054	0.74	0.002	0.02
Primary education	0.312*	1.92	0.487**	2.11
Secondary education	0.416**	2.43	0.541**	2.20
College after secondary/University	0.669***	3.48	0.624**	2.28
HH female ratio	-0.227	-1.29	0.060	0.23
HH children ratio	0.191	1.12	0.017	0.07
Total land area	-0.003	-0.58	-0.022**	-2.31
Normal PPI	0.286**	2.59	0.333*	1.66
High PPI	0.172	1.24	0.509**	2.13
Cluster F1	0.157**	2.27	0.217**	2.26
Media_trust	-0.003	-0.16	0.020	0.55
External1_trust	0.002	0.13	0.013	0.51
External2_trust	-0.010	-0.56	0.045*	1.67
Traditional_trust	-0.043**	-2.38	0.016	0.63
<i>Rho</i>			-0.170	1.61
<i>Log-likelihood</i>	-964.446		-818.772	
<i>Likelihood ratio test</i>	59.80***		100.23***	
<i>Hausman test</i>	0.73		-2.09**	
<i>Wald test exogeneity</i>	-		2.60	
<i>N</i>	1,436		806	

3.6.7 Willingness to Pay for SSU TV Programme

An economic valuation of the Shamba Shape-Up TV programme based on stated preferences of smallholder farmers in Kenya was conducted. Stated preference methods can be classified into two main groups: choice modelling and contingent valuation which can be further classified. We use a contingent valuation approach since our analysis focuses on the whole good, the Shamba shape-up programme, rather than on its attributes.

We provide a monetary value estimation of the TV programme for measurable but un-priced impacts of the programme, collective values such as acquiring information/learning about farming and benefits associated with learning (e.g. feeling more confident in implementing new techniques; knowledgeable/useful for the community), entertainment; community benefits derived from sharing information on the programme and adopting/adapting farming practices. We estimated the mean and median willingness to pay (WTP) of respondents as well as the influence of potential socio-economic determinants on WTP such as age, gender and PPI.

We asked farmers for their WTP for an episode of SSU TV programme under a hypothetical scenario. The WTP question was *“Imagine that you wanted to watch an episode of SSU but for some reason you cannot watch it at home and the ONLY place where it is shown will charge you Ksh BID1. Would you be willing to pay BID1?”* In any questionnaire, BID1 was either 5 Ksh, 10 Ksh, 15 Ksh, 20 Ksh and 25 Ksh. These values were uniformly and randomly distributed across respondents. A second, follow-up question was asked (Hanemann et al. 1991). Those who answered that they would be willing to pay BID1 were asked if they would pay 5 Ksh more. Those who answered that they would not be willing to pay BID1 were asked if they would pay 5Ksh less except for when BID1 was 5 Ksh. In this case respondents were asked if they would pay 2 Ksh. The options for the value of the bid amounts were based on earlier piloting questionnaires. Finally, we asked an open ended question: *“What is the maximum amount would you be willing to pay for a SSU episode?”* This question was introduced in order to complement information given by respondents.

The respondent’s WTP is assumed to follow a linear function

$$WTP_i = \alpha + x_i' \beta + \varepsilon_i$$

where WTP_i is the latent WTP of respondent i ; α is the constant term; x_i' is a vector of explanatory variables for the respondent’s WTP; β is the parameter vector to be estimated associated with the explanatory variables; and ε_i is the error term assumed to be normally distributed with mean 0 and standard deviation σ . The probability that the respondent’s true valuation of WTP lies between the lower and the upper bound is given by

$$Pr\{WTP \subseteq [b_{li}, b_{ui}]\} = Pr\left\{\frac{b_{li} - \alpha - x_i' \beta}{\sigma} \leq z_i \leq \frac{b_{ui} - \alpha - x_i' \beta}{\sigma}\right\} = \Phi(z_{ui}) - \Phi(z_{li})$$

where z_i is the standard normal random variable. The log-likelihood function is given by:

$$\text{Log } L = \sum_{i=1}^N \log[\Phi(z_{ui}) - \Phi(z_{li})]$$

We use interval regression to model the willingness to pay for Shamba Shape-up. Interval regression is used to model dependent variables that have interval censoring. Our dependent variable is respondents' WTP, which lies between a lower and a higher bound. The lower bound equals the highest amount to which the respondent responded "yes" and the upper bound equals the lowest amount to which the respondent answered "no". Protesters were excluded from the sample (only 3); two respondents gave "because the programme is aired free on TV" as a reason for not paying and another respondent said "the information shown should be free".

Estimates of average WTP for one episode of SSU programme are shown in Table 3.26³⁰. Results show that SSU viewers are willing to pay \$0.43 on average for a program. SSU non viewers also value the SSU episode at \$0.26.

Table 3.26: Average willingness to pay for one episode of SSU

	Average	95% Confidence interval
SSU viewer	\$0.43	\$0.40 - \$0.47
SSU non viewer	\$0.26	\$0.24 - \$0.28

Results for the estimates of determinants for maize and dairy farmers' willingness to pay for one episode of SSU are shown in Appendix Table A.6.8. Main findings are that no differences in willingness to pay were found in terms of age, gender or PPI for SSU viewers. For maize producers that also produce milk, respondents were willing to pay \$0.05 more than maize producers only. Regarding SSU non viewers, older respondents were less willing to pay than younger respondents; female respondents were willing to pay \$0.07 less than male respondents, and relatively higher PPI scores were willing to pay higher amounts than respondents with low PPI scores.

4.0 SSU and AECF anticipated results chain

AECF developed an anticipated results chain for SSU (theory of change). This chain ends with three Systemic Change indicators, which relate to 'replication', 'markets' and 'innovation'. AECF states that qualitative indicators are sufficient and more useful at the level of systemic impact. Relevant findings from the study for each of the Systemic Change indicators are presented below.

³⁰ These are obtained from an interval regression model with no explanatory variables ($WTP_i = \alpha + \varepsilon_i$) using exchange rate 1KES=US\$ 0.0113250 (20/08/2014)

1. 'Format is repeated in other countries across Africa'. (Replication)

Mediae have been asked by AGRA's SSTP programme to develop concepts to create a country-specific version of SSU for Ghana and Malawi - the latter on request of the Director of Agricultural Extension Services. The Agricultural Transformation Agency in Ethiopia has asked Mediae to create an Ethiopian version - this is currently under a proposal with the USAID ICT Challenge. Mediae have also had requests to replicate in Bangladesh, Sri Lanka, Thailand and Nigeria. (RURALTV in USA has also requested to be able to show the programmes in USA).

2. 'Improving access to information about high yielding agricultural technologies leading to increased demand for agricultural technologies in East Africa'. (Markets)

Some input dealers, para and agro vets in rural areas reported increased demand / purchases of specific inputs and services linked to SSU programme content. These included for dairy meal, dewormers, acaricides (for spraying ticks), drought resistant seed varieties, liners for water harvesting pans, vaccination of chicks, quality AI semen. Farmers also reported increased purchases of inputs to implement ideas covered in SSU. There is evidence from farmers of changed market behaviour in response to SSU. An example is potato farmers in an area who, after watching SSU, grouped together to purchase in bulk a new recommended variety of seed potato which indicated farmers demanding the new variety and systemic change in the way that they organise themselves to access inputs.

3. 'Revolutionize the dissemination of agricultural extension information and education through TV edutainment broadcasts in East Africa'. (Innovation)

In Kenya, several other stations have developed agricultural edutainment programmes and all are based on the concept of experts visiting farms and have been developed following the general approach developed in SSU. K24 is making a programme with a similar format to SSU called Kilimo Biashara. QTV is making another look-alike called Ukulima ni Ujuzi, and GBS Christian Station Kenya is developing a programme called Farm Report. Note also results under no. 1 above i.e. the development of TV edutainment programmes for agricultural extension, information and education in other countries.

5.0 Conclusions

The aim of this study was to understand and measure the impact of SSU and the process by which the programme influences farmers. In order to do this the study took a mixed methods approach that included two large quantitative surveys and a detailed set of participatory qualitative and quantitative tools. This conclusion is structured around the research questions set out in section 1.1.

1. What is the impact of the programme?
 - a. How many farmers are being reached by SSU?

Through the listing survey the study was able to statistically estimate that, in the 26 rural and peri-urban counties which comprise the programmes main target audience, Shamba Shape Up is viewed in 368,407 of households (12.6% of households in the target area or 38.9% of those households that reported watching TV in the previous four weeks). Broader than this, the listing survey gave robust estimates for TV viewership in general (948,388 [32.5%]) and the number of households with working TVs (637,851 [21.9%]). Communal viewing of SSU was found to be popular amongst the survey sample though the majority watched the programme at home. Interestingly, a third of television owners were powering their TVs 'off-the-grid', using solar energy. Anecdotal evidence suggests however that these households may conserve power during the day and watch their televisions at night (which means that would have been unlikely to watch SSU).

- b. What are the economic and social benefits gained by farmers as a result of viewing SSU?

This question was addressed through a combination of the main survey and the PQR. Through the main survey a robust estimate of the number of beneficiaries of SSU in the target population was established. The overall number of beneficiaries (those households specifically reporting that they had made changes to their maize or dairy practices as a result of SSU OR who reported that they had benefited from SSU through increased profit or improved household food situation³¹) is estimated to be 428,566 households (14.7% of all households in the study area). Concentrating on specific enterprises, for maize an estimated 218,562 households (including both viewers and non-viewers³²) reported making specific changes in their maize practice as a result of SSU and for dairy an estimated 65,063 households (including both viewers and non-viewers) reported making specific changes in their dairy practices as a result of SSU.

In terms of economic benefit the study used the gross margins of maize and dairy enterprises on a per household basis including 95% confidence intervals.

Across the target population, maize farmers who had watched and been influenced by SSU (97,446 households) benefited by \$578,785 when compared to maize farmers who had not watched or been influenced by SSU (2,151,252 households). However as the 95% confidence levels for the two groups overlap the difference has to be considered negligible.

³¹ i.e. those who may of benefited from information / influence on any of the enterprises promoted by SSU.

³² Non-viewers who were influenced by SSU are those respondents that stated that they had not viewed SSU in the previous four weeks but when asked about influences and information sources for a specific practice stated SSU; e.g. because they had watched SSU in the past or because a family member and / or friend who had watched SSU had influenced them.

Because of the general challenges associated with quantifying attributed impact and establishing change processes, and particularly as agricultural practices included in Shamba Shape Up have been promoted by several organisations and initiatives, it was important to use a combination of methods and approaches. The PQR enabled the research team to look in greater detail at a smaller number of farms to investigate both economic impact and the processes of change. The results from the PQR show a clearer impact of changes influenced by SSU. In those households that had made changes influenced by SSU gross margins had increased by an average of \$215.86 per acre. This was more than three times the increase in gross margins achieved by those households that had made changes influenced by other sources (\$70.68 per acre).

With regards to dairy enterprises, dairy farmers who were 'viewer SSU influenced' (27,157 households) benefited by \$24,139,863 when compared to dairy farmers who were 'non-viewer non-influenced' (749,245). As the 95% confidence levels for the two groups do not overlap the gross margins are far apart enough for the difference to be regarded as important.

The results for dairy farmers from the PQR are similar to those of the main survey. Households that had made changes to their dairy enterprise influenced by SSU had improved their gross margins by \$175.25 per cow (compared to an average of \$222.22 per cow from the main survey). The gross margins per cow for those households influenced by SSU were more than double those households that had made changes influenced by other sources (\$78.05 per cow).

As is discussed in section 2.4, the main survey only included broiler producers and the small number households still practicing this meant that the results were excluded from the study. However small-scale poultry keeping for eggs and or meat and using local breeds or Kenbro is common and farmers had adapted ideas from Shamba Shape Up intended for broiler production and applied them to their own systems. Results from the PQR survey (which included a small number of poultry enterprises) highlighted an increase of \$1.85 per bird (or \$46.27 per household) for households that had made SSU influenced changes in their small-scale poultry enterprise.

In both maize and dairy enterprises the PQR analysis produced evidence of gendered differences in the benefits of SSU. With regards to maize, both men and women were benefiting from the changes that they had made on their farms, though men were able to invest more in the enterprise and were seeing more benefit as a result. For dairy, both men and women were increasing their gross margins but when investigated as a proportion of their 'pre-change' gross margins, the women's had increased by a larger proportion, suggesting that SSU has helped these women to reduce the gap between themselves and the male dairy farmers. When considered by wealth, poorer households were increasing their

gross margins in both dairy and maize enterprises. In dairy enterprises, the poorer households were increasing their gross margins at a faster rate than their wealthier counterparts whilst in maize the poorer households were increasing their gross margins by a considerable amount (75%) but not to as great a degree as their wealthier counterparts (120%). It should be noted however that the sample sizes in the PQR were small.

This impact assessment has identified a range of social benefits gained by farmers viewing SSU. The PQR used effects diagrams to understand the 'real-life' impacts of the changes encouraged by SSU. Farmers reported that they were able to ensure that their family had food for the entire year, improve the health and nutritional intake of their families, diversify their livelihood choices (invest in businesses outside farming), pay school fees for their children, increase their social capital and community standing (through sharing successful ideas with fellow farmers and family members), and develop new ideas for the future, providing motivation to succeed.

The attitudinal section of the main survey was also able to highlight social benefits of SSU with almost three quarters (71%) of SSU viewers reporting that SSU has had a positive impact on their household food situation. Those viewers who reported being influenced by SSU to make changes reported that the programme helped them to learn new things about farming (88%), gave them new ideas (89%) and helped them to make decisions (84%).

Evidence from the attitudinal analysis also indicates that over the previous two years SSU viewers' on-farm situation had become more positive than their non-viewing counterparts regardless of their level of education or their PPI score.

2. What is the process by which SSU influences change? [Testing Theory of Change]
 - a. How is SSU influencing farmers' decision making and activities?

The evidence outlined in this report demonstrates that SSU is influencing farmers' decision making and activities in a positive way. The theory of change, outlined in section 3.1, that the programme is presented in a way that enables the audience to share, vicariously, in the process by which the farm household comes to a decision about the changes to try out on their farm is backed up by evidence from the main survey and the PQR. Farmers identify with the host farmer and the problems they face on their farms and are encouraged that they are also able to make positive changes on their farms as highlighted in the programme. Likewise, evidence was found of farmers adapting the changes highlighted in the programme to fit their own circumstances and in some instances of the programme sparking ideas for farmers to make changes in different enterprises altogether. Farmers clearly enjoy watching the programme and find that practices are explained in a way that is straightforward and easy to replicate, helping them to make decisions on their own farms.

- b. What role does SSU play in farmers' innovation systems?

The programme has become an important part of farmers' innovation systems. Trust in a source of information and influence has a substantial effect on the likelihood that farmers will make changes promoted or suggested by the source. Participants in the PQR scored SSU higher on trust than other, more conventional sources of information. The programme also compared well for accessibility and for timeliness of information provided. The willingness to pay analysis provides evidence that farmers value the programme and the information that it provides.

Farmers are watching SSU in a variety of settings including the home, neighbours houses, village pubs and hotels. The programme is encouraging discussion between peers, in farmer groups and less formal meetings; three quarters (74%) of viewer SSU influenced farmers pass on information shown in the programme and 87 per cent recommend the programme to their friends.

As well as watching SSU, farmers discussed interacting with SSU through the SMS service, reading brochures and accessing information online. The programme had encouraged farmers to actively seek this information and further from these interactions, farmers went on to share the information that they received with neighbours and with formal and semi-formal groups in which they were involved and also to seek clarifications with extension workers and input suppliers. In a specific example from Nakuru, farmers had organised themselves to source and pay for a new potato variety in bulk from another county after the variety was promoted in an episode of SSU. The programme was also influencing non-farming actors in the innovation system. Family members and / or friends were sharing information on farming with their family and friends over the phone and, in some cases, providing financial support for the ideas. Extension officers and input suppliers also reported watching SSU and using the programme as a source of new agricultural information to share with farmers or to refresh their agricultural knowledge.

This study sought to conduct a rigorous and objective assessment of the effects of the Shamba Shape up edutainment programme. Shamba Shape Up has clearly influenced a large number of small-scale (particularly dairy) farming households in the area of Kenya that it targets and the innovation systems within which farmers operate.

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