THE POWER OF TELEVISION IN TRIGGERING FEEDBACK THROUGH MOBILE PHONES

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ACRONYMS

CGIAR	Consultative Group on International Agricultural Research
EADD	East Africa Dairy Development
FTA	Forests, Trees and Agroforestry
ICRAF	World Agroforestry Centre
ICT	Information Communication Technology
IFPRI	International Food Policy Research Institute
PIM	Policies, Institutions and Markets
SMS	Short Message Service
SSU	Shamba Shape UP
TV	Television

1.0 INTRODUCTION AND BACKGROUND

In recent years, research and development institutions working with farmers have initiated successful agricultural practices that have the potential to increase food security, reduce poverty and help mitigate against the effects of climate change. Despite the increasing number of successful agricultural initiatives, it is clear that most of them are still only 'islands of success.' Whether the potentials and spread of these initiatives are realized will depend on levels of investment, appropriate policies and the development and promotion of new methodologies for scaling up and mechanisms for receiving and providing feedback. For many years, national governments have been the sole provider of extension services to farmers in Sub-Saharan Africa. Yet despite decades of investment in and experience with public extension programs, evidence of their impact upon agricultural knowledge, adoption and productivity remains limited. Furthermore, the extension services themselves have been criticized for high costs, problems of scale and lack of accountability. The linear model of extension that was used was criticized for transferring messages from researchers in research institutions, ministries of agriculture to extension workers and finally to farmers and hence has limited capacity for feedback. Furthermore the messages can get confused or misinterpreted along the way. Secondly, there has been a decline of government funding to extension services in recent years. In Kenya, over 5 million small scale farmers rely on around 5,500 agricultural extension workers for advice and information. But with a ratio of one extension worker to over 1,000 farmers, Kenya's farmers aren't getting the services they need. New technologies to disseminate information to farmers beyond face-to-face interaction are therefore crucial to filling this gap.

The rapid spread of Information Communication Technology (ICT) in developing countries offers a unique opportunity to disseminate knowledge via private and public information systems and also receive feedback. ICTs play a significant role in enhancing agricultural production. ICT is any device, tool, or application that permits the exchange or collection of data through interaction or transmission. The ICTs- based solutions are increasingly being advocated for by extension practitioners for use in agricultural production. ICTs range from traditional radio programs using add-on features, television shows and using short message services to request for information and emerging mobile technologies services and use of internet (Mbo'o-Tchouawou and Colverson, 2014)

Over the past decade, mobile phone coverage has spread rapidly in sub-Saharan Africa. Coinciding with this increase in mobile phone coverage has been an increase in mobile phone usage. Africa is currently the second biggest mobile market in the world. In the year 2011, 93% of Kenyan households owned a mobile phone and 73% were mobile money customers (Demombynes and Thegeya, 2012). There is therefore a huge potential for innovation in mobile technology and its application, including access to

relevant and timely agricultural information. The adoption and use of ICTs especially mobile phones has been necessitated by increased affordability, accessibility, adaptability, low-cost and pervasive connectivity, innovative business models and partnerships and democratization of information (World Bank, 2011). Mobile phones significantly reduce communication and information costs for the rural poor. This not only provides new opportunities for rural farmers to access information on agricultural technologies, but also to use ICTs in receiving advice and providing feedback, creating a learning culture.

In addition to mobile phone technology, TV viewers in Kenya have increased rapidly. In Kenya 44.2% of rural households and 81.2% of urban households own a TV and an estimated 14 million Kenyans watch TV weekly. With increased coverage and TV productions tailored towards agriculture, rural farmers can have access to information at the comfort of their homes. In a study of farmers in Iran, it was found that there was a significant increase in the level of awareness and knowledge among viewers. TV also has ability to disseminate information to a large number of people hence can be considered for scaling up adoption and information sharing (Movius et al., 2007; Nazari and Hassan 2011).

This study aimed at identifying innovative ways to reach farmers through testing the effectiveness of integrating TV and mobile phone technology in enhancing feedback mechanisms among smallholder farmers. The hypothesis was that the use of TV shows in providing agricultural information to farmers can trigger a high level of interest and feedback through mobile phone technology and hence can change attitudes, increase knowledge and change behavior leading to increased adoption of agricultural technologies.

2.0 MATERIALS AND METHODS

The World Agroforestry Centre (ICRAF) partnered with a media company that has been running an agricultural programme on TV known as the Shamba Shape Up (SSU) show in three East African countries for the last three years. SSU show is a makeover edutainment production created by the Mediae Company whose aim is to educate and entertain farmers through series of shows that tackle issues surrounding livestock, poultry, crops and soil fertility. The show is broadcast on citizen TV in Kenya. Each episode is broadcast twice a week; in English (Saturday afternoon) and Swahili (Sunday afternoon). Each episode takes approximately 30 minutes. In each weekly episode, one farmer/farm is featured where current issues and problems facing the household are discussed. Solutions and opportunities for improvement are identified by experts invited to the show. For this study, innovative fodder practices that have been proven by research to improve food security, nutrition and mitigate against the effects of climate change were filmed in farmers' fields in Kenya in areas where the East Africa

Dairy Development (EADD) project run by a consortium of five research and development partners has been working with farmers over the past 5 years. The project adopted an experimental plan which was as follows:

1) A pre-broadcast survey administered to dairy farming households that own TV sets to gather data that was later used to form a basis for measuring change in attitudes, knowledge and behavior
2) Identification and filming of four TV shows in selected dairy farmer fields showing practical examples of innovative fodder practices
3) To obtain feedback from farmers, viewers were given a hotline short code in which they texted their feedback or to obtain expert advice. The hotline was linked to a computer program to track and record the text messages. The question or information was shared with experts who provided a tailored response. This is because farming systems are complex and heterogeneous and what works in one farm, may not necessarily work in another due to differences in biophysical, socioeconomic and cultural circumstances;
4) Every episode aired presented leaflets which farmers could request for via SMS. The leaflets requested were then posted to farmers. Data gathered from the SMSs and calls received were disaggregated by gender to determine the type of feedback requested and whether it varies by gender, region and practice
5) Four episodes of the episode were aired in English and Kiswahili on a popular TV station in Kenya and also broadcast in Uganda and Tanzania
6) Six months after the airing of the first show, a post broadcast survey was carried out to assess the effectiveness of the show in changing farmers' attitudes, knowledge and in bringing about the adoption of agricultural technologies
7) A mail/postal survey was administered to 500 viewers to get their feedback on the knowledge they gained from the show.
8) An SMS survey was rolled out to 300 viewers of the show. The objective was to assess the cost efficiency of SMS survey in collecting feedback from viewers.

2.1 PRE-BROADCAST SURVEY

A pre-broad cast survey was undertaken in March 2015 by a consultant commissioned by the Mediae Company. About 800 respondents were interviewed. The sample was split between

a. Those who own a TV and do not watch and do not watch SSU nor listen to SSU radio.
b. Those who own a TV and watch SSU (TV viewer) and
c. Those who have a radio and listen to SSU Radio

2.2 FILMING OF FOUR EPISODES

Identification and filming of four TV shows in selected dairy farmer fields showing practical examples of innovative fodder practices was undertaken by the Mediae Company.

2.2.1 SERIES 5 EPISODE 11: CALLIANDRA SEED PREPARATION, NURSERY ESTABLISHMENT AND MANAGEMENT

This episode featured Dr. Evelyne Kiptot, an ICRAF Social Scientist and was filmed in Bomet County in the Rift Valley Region. The episode focused on nursery establishment and management of calliandra. It can be accessed via the following link http://www.shambashapeup.com/viewepisode/240. Several steps in nursery establishment were covered as described below.

Step 1- Planning stage

- Seedlings should be ready during the onset of the rains
- Seedlings take about 3-4 months in the nursery before they are ready for planting.
- Farmers should consider source of water, whether they dependent on rain or irrigation
- Farmers should consider the source of seeds/seedlings

Step 2- Methods for nursery establishment

a) Nursery (highly recommended because of high germination and seedling survival)
b) Direct sowing in the pot
c) Direct sowing on the farm (only recommended if there is plenty of seed, adequate rain, farmers willing/able to protect the seedlings as they germinate)

The farmers can also use containers or bare rooted plants. Recommended containers for sowing seeds include:

- Polythene bags/tubes (commercially available)
- Recycled containers (milk packets, old tins or plastic containers)
- Container made from woven banana fiber

Step 3- Locating and establishing a nursery

Factors to consider when choosing a nursery site

- Locate the nursery in a secure place
- The site should have a reliable source of water
- Should be on a level ground
- Soils should be well drained

Step 4- Preparing the nursery bed

- Lay out the seedbed at a width of about one metre (3 feet). The length can vary with the available space. If there is more than one nursery bed, leave a path 0.6-1.0 metre (2-3 feet) wide between adjacent beds
- To each seedbed apply one container of well-decomposed manure for every four containers of soil. This translates to about one 20-litre container of manure for every 3 metre (9-foot) length of the nursery bed.
- Mix the soil and the manure thoroughly. A balanced soil mixture ensures good soil aeration and drainage, and an adequate supply of plant nutrients.
- To make raised beds (also called Swaziland beds), pile up the soil and manure mixture to a height of 0-5 cm (4-6 inches), and then level it.
- Support the sides of the bed with locally available materials such as banana stems, timber or stones and secure them firmly with wooden pegs or stones. Use these beds in areas with adequate water

Step 5- Seed pre-treatment

Calliandra seed has a hard coat that needs to be softened by soaking the seeds in water

- Seeds should be soaked in cold water (room temperature) for a minimum of 48 hours/overnight. The soaking should be stopped once most seeds have swollen. The seeds should be sown immediately after.
- Seeds should never be boiled, as this kills them

Step 6- Sowing the seed

- Make a furrow that is about (2.5 cm or 1 inch) deep. Furrows should be 10 cm (4 inches) apart. A seedbed of 1 x 3 metres (3 x 9 feet) produces about 600 seedlings
- Place the pre-treated seeds about 5 cm (2 inches) apart within the furrow, and cover them lightly with soil.
- Seeds should never be left exposed on the soil surface, but neither should they be too deep into the soil, where they are likely to rot.

Step 7- Where calliandra can be grown on the farm

Calliandra can be established as a hedge in the following areas.

- Along external and internal farm boundaries. As a hedge to divide different cropped area on the farm
- Along soil and water conservation terraces. Its deep roots help in stabilizing soil conservation structures
- Around the homestead. In addition to providing fodder for livestock, hedges around the homestead can also provide privacy and fencing the family house
- In fodder banks. These are plots set aside for fodder production.
- In kitchen or home gardens. Calliandra hedges can be planted along the boundaries of kitchen gardens

- In Napier plots. A hedge of calliandra can be planted after ever 2 lines of Napier. This gives a minimum of 3 meters (10 feet) apart from each hedge.

Step 8- Planting calliandra seedlings in the field

- For proper establishment and growth it is best to transplant seedlings during the onset of rains and continuous rainfall is expected for at least two months.
- Ensure the site is free from weeds.
- Prepare planting holes about 20 centimeters (8 inches) wide and 30 centimeters (12 inches) deep.
- In drier areas make bigger holes than above to help in soil moisture retention.
- Separate the top soil from the rest of the soil dug below 5 inches,
- Mix this top soil with about 1kg tin-full of manure for every tree
- Ensure the seedlings are hardened off by removing the shading from the top of the nursery and reducing watering to only once every 2 to 3 days for a period of 2 weeks before transferring the seedlings to the field.
- Carefully remove seedling from the polythene tubes before planting ensuring the trees have some soil attached to their roots
- Place the seedling upright in the prepared hole and fill the space with the mixture of top soil and manure.
- Compact the soil and manure mixture around the seedling to make it firm.
- Water the seedlings to enhance survival.
- Regular weeding and annual application of manure is necessary for faster growth and increased herbage production.
- To be able to feed 6- 10 kg of fresh leaves per cow per day, a farmer needs to plant about 500 trees per cow. This is about 250 meters long if planted in a single row hedge and 125 meters long if planted in double row hedge.

2.2.2 SERIES 5 EPISODE 13: REASONS FOR GROWING FODDER SHRUBS

This episode which was filmed in Koyugi location, Homa Bay County, Kenya featured Sylvia Wafula, a livestock feeds advisor. The episode can be viewed via the link http://www.shambashapeup.com/viewepisode/256 .

The episode focused on the use of fodder shrubs in feeding of livestock for better milk production and income generation. The following topics were discussed.

What are fodder shrubs?

- They are shrubs/ trees that provide feed to livestock.
- This could be in the form of pods/twigs or leaves

Examples of fodder shrubs

Calliandra, *L.trichandria*, Tree lucerne, Mulberry, Grillicidia, Sesbania.

Why grow fodder trees and shrubs on the farm?

- They don't take a lot of space, can be planted in many different areas on the farm
- Deep rooted and remain green even during the dry season
- Some fodder shrubs fix Nitrogen
- For firewood, forage for livestock/bees, poles, soil erosion control, shade, windbreak
- Source of protein to livestock
- Can be harvested year-round, providing fodder even during the dry season
- They can withstand repeated pruning
- Because the trees are deep-rooted, they provide nutritious feed throughout the dry season, thereby helping farmers stabilize production and take advantage of the higher dry-season milk prices.

Limitations

- Some fodder shrubs compete with crops
- Others such as calliandra do not produce many seeds
- If not pruned, can suppress the yields of adjacent crops

Income generation

- Source of income through the sale of seeds, leaf meal and milk
- Growing own source of protein, thereby reducing the cost of buying other sources of protein
- Leguminous shrubs fix nitrogen thereby improving soil fertility hence reducing the amount of inorganic fertilizer required

2.2.3 SERIES 5 EPISODE 18: INTEGRATING CALLIANDRA IN FEED RATION FORMULATION

This episode was filmed in Kashata, Kirinyaga County. It featured Josephine Kirui, a livestock feeds advisor. It can be viewed via the link
http://www.shambashapeup.com/viewepisode/266

The episode focused on integration of calliandra and other fodder shrubs into the daily livestock feed ration for increased milk production

Why feed calliandra to livestock

- Calliandra is a good source of protein

- It is drought tolerant and remains green even during the dry season
- Since it is produced on the farm it saves the farmer the cost of buying protein supplements

What to consider when feeding a dairy cow

- A cow requires fodder of approximately 3 % of its body weight
- To determine the weight of the animal use cow's girth and ordinary tailors tape measure. This was demonstrated during the episode
- Consider feed resource found on the farm

How to calculate the amount of feed in dry matter

- A cow requires fodder that is 3 % of its body weight. For instance a 300kg cow will require 9kg of dry matter(feed)

Estimating amounts (kg) of fodder shrub material to be fed

- Aim is to feed 6kg of fresh material per cow per day or 3 kg of dry feed per cow per day
- Using arm measure
- Bucket (chopped fodder shrub)
- 70 kg meal gunny bag(chopped fodder shrub)

An example of feed rations containing calliandra

- A portion Napier grass, silage, pulverized stover and calliandra (6kg actual) to feed the cow (based on the weight of cow)

2.2.4 SERIES 5 EPISODE 26: HOW TO CONSERVE SURPLUS CALLIANDRA

This episode was filmed in Uthiru, Nairobi County. It featured Sylvia Wafula, a livestock feeds advisor. It can be viewed via the following link:
http://www.shambashapeup.com/viewepisode/273
During the rainy season a farmer may have plenty of biomass from their calliandra shrubs. The surplus can be conserved as leaf meal and stored for use during the dry season.

The following steps for conserving calliandra were demonstrated.

Steps

1. Harvest the shrubs during the rainy season when there is high production
2. Spread the material on a clean canvas under shade.
3. Let it dry for 2-3 days until they are dry enough to crumble in your hands. Properly dried leaf meal should maintain its' green colour.

4. Remove and discard the stick and other non-leafy materials. Pack the leafy material in bags that allow air circulation e.g. gunny bags.
5. Store in a cool dry place.
6. Feed 2-3 kg of the leaf meal per cow per day as a protein supplement. (1kg empty tin container holds about 0.25kg leaf meal)
7. This leaf meal can be mixed with other feed feedstuffs like maize bran, wheat pollard, and bulk forages like hay, silage to make homemade dairy rations.
8. One can also earn income by packaging and selling the leaf meal.

2.3 POST-BROADCAST SURVEY

The survey was conducted in October 2015, six months after the first episode in series 5 was aired. The same sampling framework used in the pre-broadcast survey was used.

2.4 POSTAL SURVEY

The postal survey was undertaken to: i) get feedback from viewers on what they learnt from SSU and ii) determine whether there was a change in farmers' attitude, knowledge and behavior. A database of TV viewers was used to randomly select 500 respondents from a list of 1,148 viewers who had texted their feedback using the provided hotline short code. The 500 selected viewers were sent questionnaires through the post and requested to return the completed forms within a specific time.

The project team sent hardcopy questionnaires through the national postal corporation enclosed with a return envelope with a postage stamp. The enclosed envelop with a postage stamp was provided to increase the likelihood of returning the completed questionnaire without incurring any costs. The questionnaire focused on questions regarding acquisition of new knowledge and change in attitude by farmers who watched SSU.

2.5 SMS SURVEY

An SMS survey was administered to 300 randomly selected SSU viewers to determine whether they benefited from watching the SSU and the cost efficiency of using SMS as a data collection tool.

3.0 RESULTS AND DISCUSSION

3.1 PRE-BROADCAST SURVEY

3.1.1 ENTEPRISES PRACTICED BY FARMERS

The majority of farmers (over 90%) grow maize, followed by beans. Poultry and dairy farming come third and fourth respectively (Figure 1)

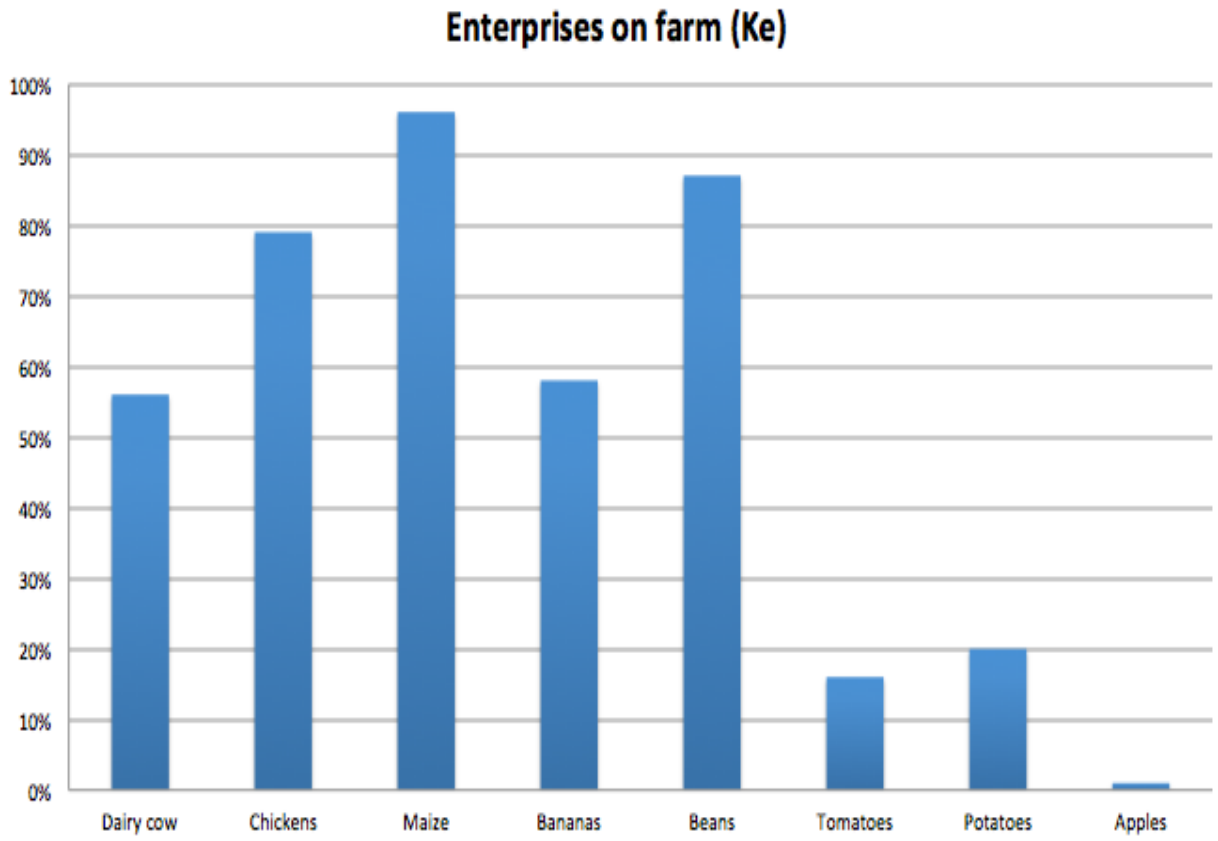

FIGURE 1: FARM ENTERPRISES PRACTICED BY FARMERS

Source: Mediae Company, 2015

3.1.2 INFORMATION SOURCES

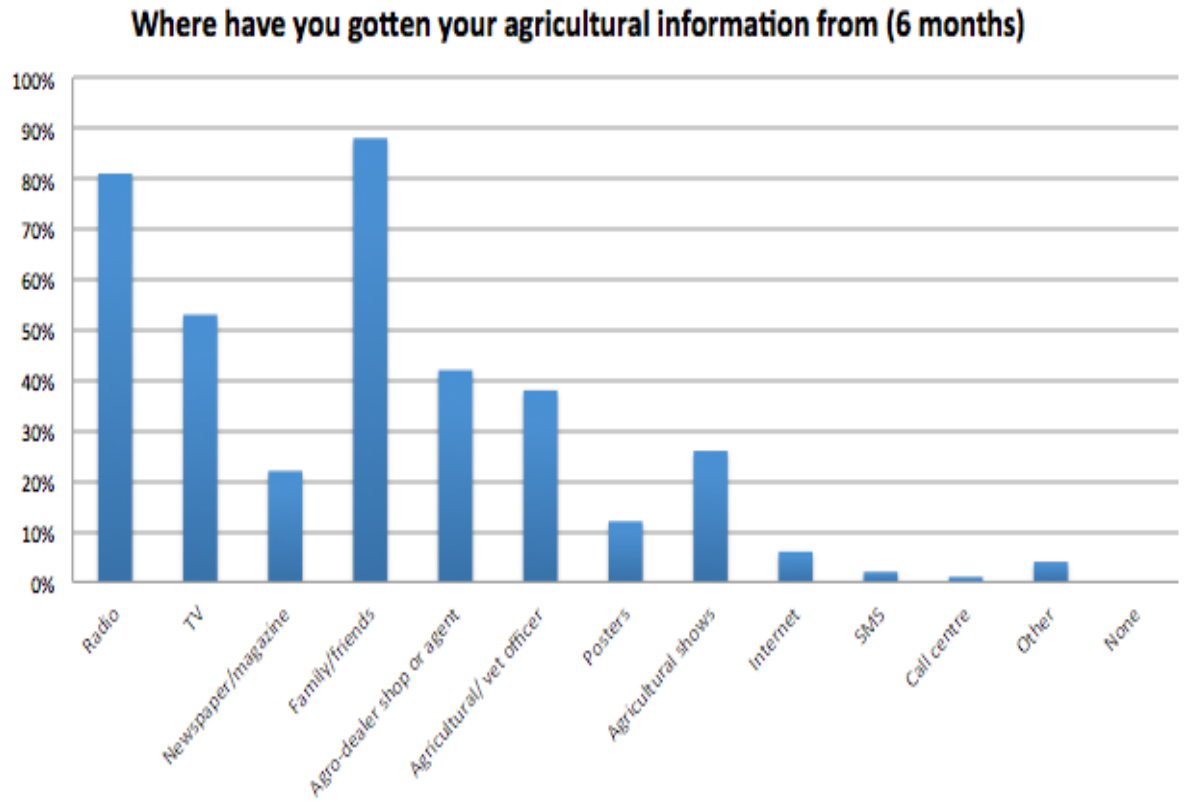

FIGURE 2: INFORMATION SOURCES FARMERS USED IN THE LAST 6 MONTHS

Source: Mediae Company, 2015

The study showed that most farmers received agricultural information from family and friends (88%), Radio (80%) and slightly over 50% from TV. These results confirm findings by Kiptot et al. (2007) and Mwambi et al. (2015) that show that informal social networks such as relatives and friends are important avenues for accessing information. Another popular avenue is radio. A good proportion of Kenyan households have access to radios and there has been a significant growth of community radio stations in the country (Mzungu, 2013). Most of these agricultural programmes are aired in local languages hence their popularity among rural communities.

3.1.3 LIVESTOCK FEED

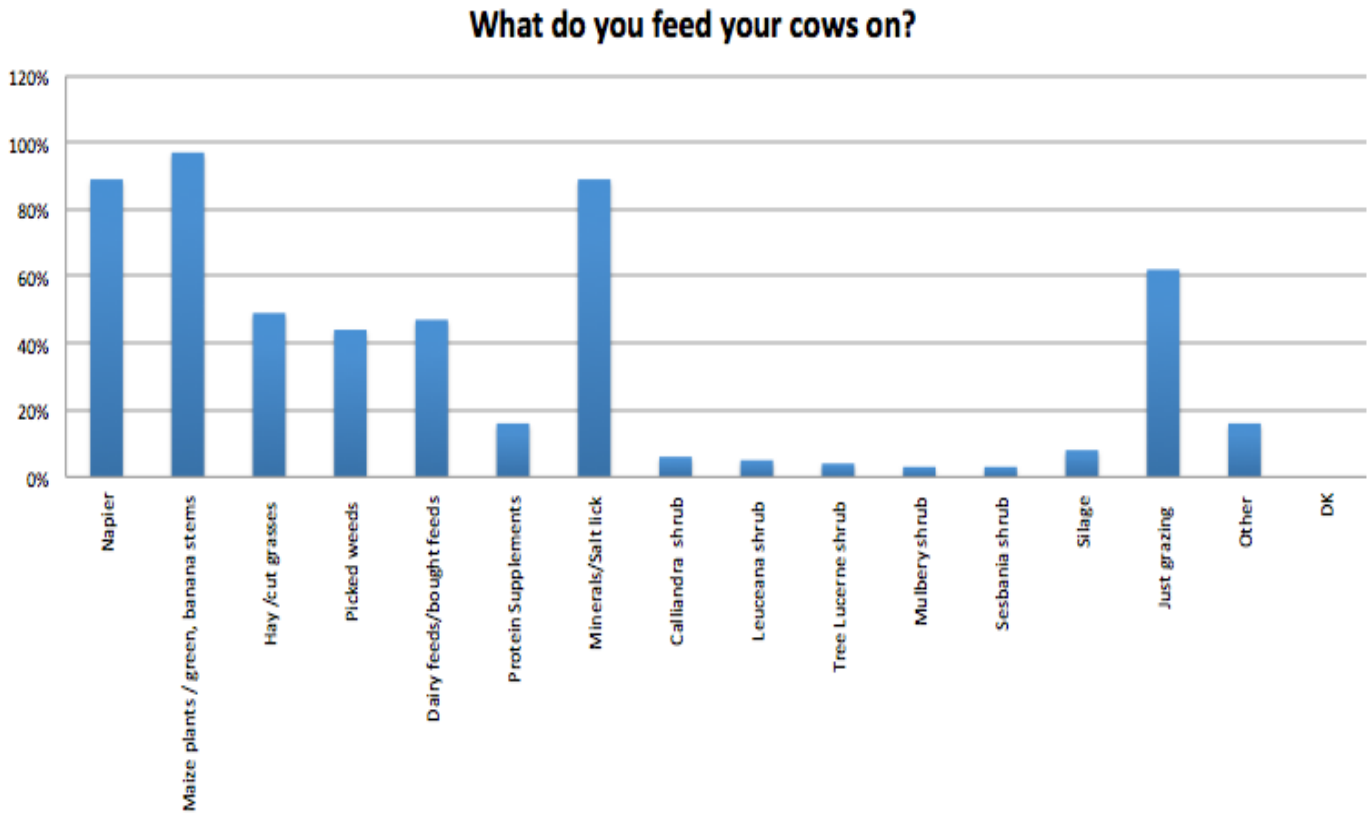

FIGURE 3: PROPORTION OF FARMERS FEEDING DIFFERENT FEEDS TO THEIR DAIRY COW

Source: Mediae Company

Majority of dairy farmers feed their livestock maize plants and banana stems (98%). Less than 5% feed their livestock with fodder shrubs such as Calliandra, Leuceana, Tree Lucerne, Mulberry and Sesbania (Figure 3).

3.2 SMS FEEDBACK FROM TELEVISION VIEWERS

3.2.1 PROPORTION OF MALE AND FEMALE VIEWERS WHO TEXTED AFTER THE SHOWS

From the four aired episodes featuring ICRAF scientists, a total of 1220 farmers wrote feedback SMS requesting both leaflets and asked questions regarding the show. Of these, 27.30 % were female and 66.07% male (Table 1).

TABLE 1: PROPORTION OF FEMALE AND MALE VIEWERS THAT WROTE BACK FEEDBACK SMS

Gender	Frequency	Percentage
Female	333	27.30%
Male	806	66.07%
Missing	81	6.64%
Total	1220	100%

In a World Bank report in 2011, 80% of Kenyan adult population owned their individual mobile phones while an additional 10% used a mobile phone owned by someone else. Slightly lower numbers of women owned individual mobile phones than male while women were more likely to use mobile phones by someone else (Demombynes and Thegeya, 2012). From the results in this study, lower numbers of women farmers wrote back feedback SMS even though findings by Mediae Company found that 54% of the viewership of the SSU is women compared to 46% of men (Mediae Company, 2013). Other factors other than viewership could therefore impact the ability of women to write back SMS or ask for specific information on the show. One of the factors could be literacy levels which may affect the ability to send text messages. Research has shown that women in Sub-saharan Africa have lower literacy levels than men (UNESCO, 2007). Such factors could be of high importance if TV would be used as source of information dissemination and also receiving feedback from farmers.

From the show, feedback SMS that indicated location was received from farmers in 44 out of the 47 counties in Kenya (Table 2). The highest number of viewers that wrote back SMS feedback were from Nairobi County (20%), followed by other major towns such as Nakuru, Kiambu and Meru (Table 2).

TABLE 2: PROPORTION OF VIEWERS THAT WROTE BACK FEEDBACK SMS FROM DIFFERENT COUNTIES

	County	Number of farmers	Percentage (%)
1.	Nairobi	242	19.84
2.	Nakuru	74	6.07
3.	Kiambu	60	4.92
4.	Meru	46	3.77
5.	Uasin gishu	42	3.44
6.	Kisumu	40	3.28
7.	Kakamega	38	3.11
8.	Mombasa	37	3.03
9.	Nyeri	36	2.95
10.	Trans nzoia	33	2.70
11.	Kericho	28	2.30

12.	Kirinyaga	28	2.30
13.	Machakos	27	2.21
14.	Nandi	24	1.97
15.	Baringo	22	1.80
16.	Bungoma	22	1.80
17.	Kajiado	22	1.80
18.	Busia	21	1.72
19.	Vihiga	20	1.64
20.	Laikipia	19	1.56
21.	Muranga	18	1.48
22.	Bomet	15	1.23
23.	Kilifi	15	1.23
24.	Migori	15	1.23
25.	Homa Bay	14	1.15
26.	Kisii	14	1.15
27.	Taita taveta	14	1.15
28.	Siaya	13	1.07
29.	Embu	12	0.98
30.	Makueni	12	0.98
31.	Nyandarua	12	0.98
32.	Narok	11	0.90
33.	Tharaka nithi	10	0.82
34.	Nyamira	8	0.66
35.	Elgeyo marakwet	7	0.57
36.	Kwale	5	0.41
37.	Kitui	4	0.33
38.	Lamu	4	0.33
39.	Garissa	2	0.16
40.	Isiolo	2	0.16
41.	West pokot	2	0.16
42.	Marsabit	1	0.08
43.	Samburu	1	0.08
44.	Tana River	1	0.08
45.	**Tanzania**	**1**	**0.08**
46.	**Total**	**1094**	

In Kenya 44.2% of rural households own a TV compared to 81.2% of urban households (Mediae Company, 2013). In a study done in 2014, majority of households had access to TV with major towns like Meru, Kiambu and Nyeri having relatively a higher number (AECF, 2014).

The least SMSs were received from arid regions of Kenya such as West Pokot, Samburu and Marsabit. These areas are rural and characterized by pastoralism and less agricultural production with exception of West Pokot where a few areas in the region are in the humid highlands (ASDSP).

In all of the four aired episodes, as earlier highlighted male farmers wrote back SMS more than female farmers (Figure 4). From the feedback received, Episode 13, which focused on advantages of fodder shrubs, attracted slightly higher number of females

than other episodes. The episode focused on the use of fodder shrubs in feeding livestock for better milk production and income generation.

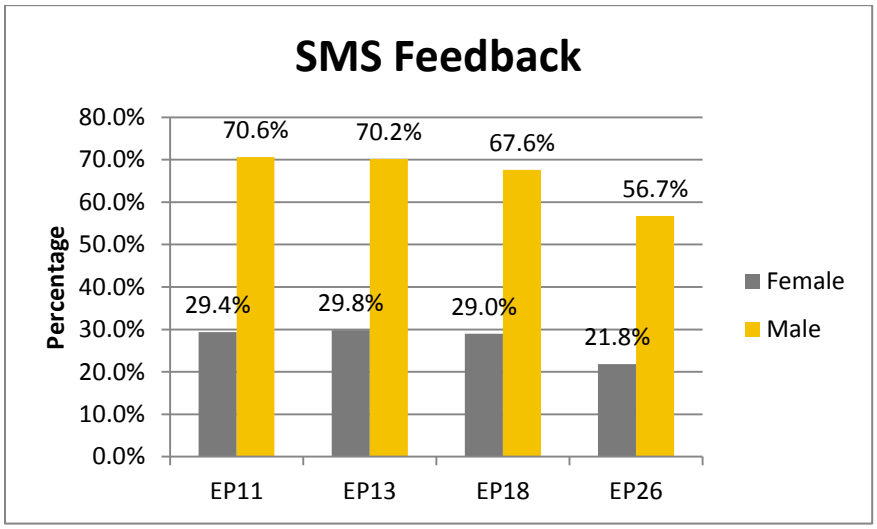

FIGURE 4: SMS FEEDBACK FROM THE FOUR AIRED EPISODES

3.2.2 PROPORTION OF VIEWERS THAT REQUSTED FOR LEAFLETS AND INFORMATION ON DIFFERENT TOPICS

A higher number of farmers requested all available leaflets (67%), followed by specific questions about topics that had been featured in the episodes (9%) and contacts of farmers featured on the shows (Table 3). Farmers featured on the show highlighted challenges they face and innovative practices they undertake in their day to day farming practices. These practices may be similar to those undertaken by other farmers viewing the show and therefore might be the reason for requesting for farmer contacts so that they can ask them questions directly. From the AECF (2014) report, 70% of farmers identify themselves with the problems facing fellow farmers featured on SSU with 67% caring about the families shown in the programme.

Subsequently, since the show and feedback is majorly demand driven, farmers wrote back feedback based on their interests and challenges they face. The feedback did not however align with previous findings by Mediae Company (2013) where farmers highly ranked poultry and dairy farming as the farming practices they would like more information during the show.

TABLE 3: RESPONSES BY VIEWERS REQUESTING FOR LEAFLETS ON DIFFERENT TOPICS, REVISITS OR FARMER DETAILS

Responses by farmers	Female		Male		Total	
	Frequency	Percentage (%)	Frequency	Percentage	Frequency	Percentage
All	205	61.6	577	71.6	818	67.0
Cattle	3	0.9	8	1.0	12	1.0
Farmer contacts	31	9.3	44	5.5	75	6.1
Fodder trees		0.0	5	0.6	8	0.7
leaflet		0.0	4	0.5	4	0.3
Maize	2	0.6	1	0.1	7	0.6
Others	21	6.3	66	8.2	111	9.1
Poultry	17	5.1	30	3.7	51	4.2
Revisit	13	3.9	17	2.1	30	2.5
SoilCares	13	3.9	18	2.2	32	2.6
Solar		0.0		0.0	3	0.2
Visit	7	2.1	10	1.2	19	1.6
(blank)	21	6.3	26	3.2	50	4.1
Total	**333**		**806**		**1220**	

The analysis of feedback received from each episode shows that it depended on the content of the show (Table 4). For instance in Episode 11, a higher number of farmers requested for leaflets featuring all topics followed by contacts of farmers featured on the SSU show. In Episode 13, a higher number of farmers asked about SoilCares which was a major theme during the episode. Soilcares is an NGO that provides soil analysis services to farmers. Episode 18, which was as a re-visit to a farmer field already visited before in the show, most farmers wrote back SMS on general questions which is represented by "other" category, followed by request of revisit leaflets. "Other" category of messages encompassed general questions asked by farmers on the show, specific challenges farmer experience in their farms and possible solutions that they can apply, SSU contacts and offices in the counties etc. Viewers from all counties mostly requested all leaflets produced for the SSU show and contacts of farmers featured in the show (Table 5).

3.3 POST-BROADCAST SURVEY

The post-broadcast survey was carried out in October 2015 by a consultant commisioed by the Mediae Company. The report can be viewed on the following link: http://shambashapeup.com/static/uploads/SSU_Series_5_KAP_Report_2015.pdf. Results of the post broadcast survey show an increase in the use of calliandra as a fodder for livestock. Viewers are 4-5% more likely to use calliandra and other fodder shrubs than non-SSU viewers. Those who grow calliandra intercrop it on their farms or plant it on internal boundaries as recommended on the SSU show. Awareness of the

benefits of fodder has grown significantly with viewers showing 20% and 50% improved awareness of health and milk benefits. However, viewers would like to learn more about the use of calliandra as a dry season feed.

TABLE 4: FEEDBACK FROM DIFFERENT EPISODES IN SERIES 5

Featured Episodes/Feedback messages	EPISODE 11	EPISODE 13	EPISODE 18	EPISODE 26	Total
	No. of viewers				
All	245	177	155	241	818
Cattle	3	2	6	1	12
Farmer contacts	60	8	2	5	75
Fodder trees	2	1		5	8
leaflet	3		1		4
Maize				7	7
others	23	24	38	26	111
Poultry	23	11	9	8	51
Revisit		5	24	1	30
SoilCares		29	1	2	32
Solar				3	3
Visit	1	8	3	7	19
(Blank)	1		20	29	50
Grand Total	**361**	**265**	**259**	**335**	**1220**

TABLE 5: FEEDBACK OF SMS RECEIVED BY COUNTY

No	County/ SMS responses	All	Cattle	Farmer	Fodder trees	leaflet	Maize	Others	Poultry	Revisit	Soil Care	Solar	Visit	Blank message	Total
1	Baringo	18	1					3							22
2	Bomet	9		1	1				1					3	15
3	Bungoma	12						2	4	1				3	22
4	Busia	14	1	1				1	1	1			1	1	21
5	Elgeyo marakwet	4						1	1				1		7
6	Embu	9		1				2							12
7	Garissa	1						1							2
8	Homa Bay	7	1	1				2		2	1				14
9	Isiolo										1		1		2
10	Kajiado	15						4	1		2				22
11	Kakamega	23	2	2				3	2	2	1		1	2	38
12	Kericho	18	1	6					1	1			1		28
13	Kiambu	43		7		2		2			2		1	3	60
14	Kilifi	9		3			1	1						1	15
15	Kirinyaga	24		2					1		1				28
16	Kisii	12							1					1	14
17	Kisumu	30		2				2	3	1	2				40
18	Kitui	4													4
19	Kwale	4		1											5
20	Laikipia	12		1				3			1			2	19
21	Lamu	3		1											4
22	Machakos	17		1	1			2	1	1	3			1	27
23	Makueni	10						2							12
24	Marsabit	1													1
25	Meru	26		6				6	1	3	2		1	1	46
26	Migori	11							2	2					15
27	Mombasa	27	1	3			1	1	1	2				1	37
28	Muranga	13						3			1		1		18
29	Nairobi	169	2	24	2		1	10	8	8	7		2	9	242

30	Nakuru	48	1	2		1		8	5	2	5		1	1	74
31	Nandi	18		1				3	1	1					24
32	Narok	10									1				11
33	Nyamira	8													8
34	Nyandarua	9		1				1						1	12
35	Nyeri	25		2				3	1				1	4	36
36	Samburu				1										1
37	Siaya	11							1	1					13
38	Taita taveta	9		2				2						1	14
39	Tana River	1													1
40	Tharaka nithi	7		1				1	1						10
41	Trans nzoia	20		1		1		5	2	2			1	1	33
42	Uasin gishu	25	1	1				6	6				1	2	42
43	Vihiga	11		1				4			1		1	2	20
44	West pokot	2													2
45	Tanzania	1													1
	(blank)	68	1		3		4	27	5		1	3	4	10	126
	Grand Total	**818**	**12**	**75**	**8**	**4**	**7**	**111**	**51**	**30**	**32**	**3**	**19**	**50**	**1220**

3.4 POSTAL SURVEY

A total of 171 respondents returned the questionnaires. About 79% of these were males while only 20% were females. The explanation for this is that the population used to select the sample size selected for the postal survey was smaller for female respondents due to the fact that fewer females texted after watching the shows. Another explanation could be that some female respondents may also not have returned the questionnaires due to other reasons such as immobility.

3.4.1 AGE AND EDUCATION LEVEL OF RESPONDENTS

The respondents had an average of 44 years. There was no significant difference between age of female and male respondents. Most respondents (62%) had attained college/university level of education (Table 6) and therefore had no difficulty in responding to the questions.

TABLE 6: RESPONDENTS HIGHEST LEVEL OF EDUCATION

Respondent highest level of education	**Percent N=1220**
Primary	6.4
Secondary	31.0
College/University	61.4

3.4.2 RESPONDENTS PLACE OF RESIDENCE

The majority of respondents were from rural areas (71.6%) while 26.6% live in urban areas. Slightly less than 2% indicated to live in both urban and rural areas (Figure 5).

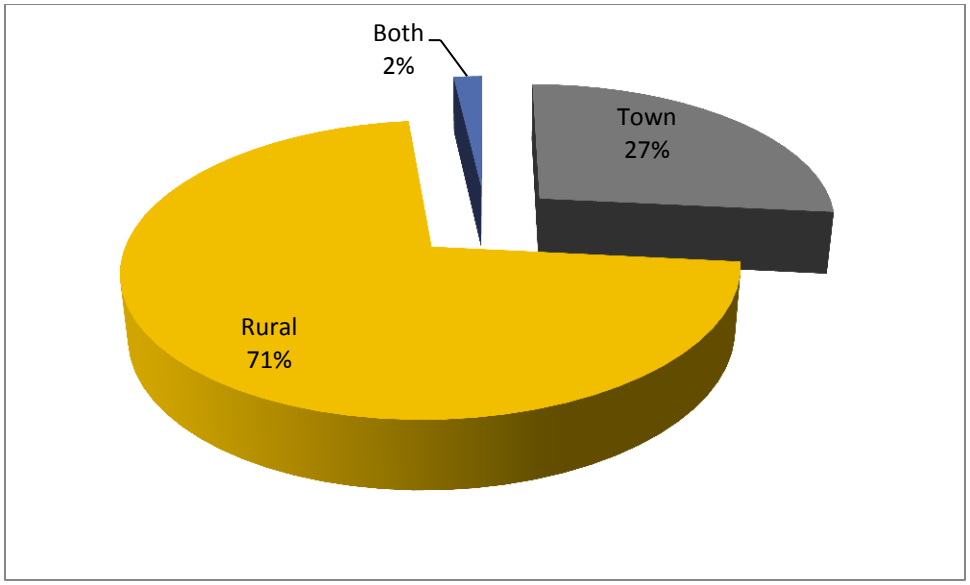

FIGURE 5: RESPONDENTS PLACE OF RESIDENCE

3.4.3 KNOWLEDGE ON CALLIANDRA BEFORE AND AFTER WATCHING SSU

In the postal survey questionnaire, respondents were also asked about knowledge on calliandra learnt from SSU or learnt elsewhere. Only 39.3 % of females and 28.6% of male respondents knew about calliandra as a feed for livestock before watching the SSU. About 60.4% and 33.9% of male and female viewers respectively learnt new knowledge from the SSU show ((Figure 6).

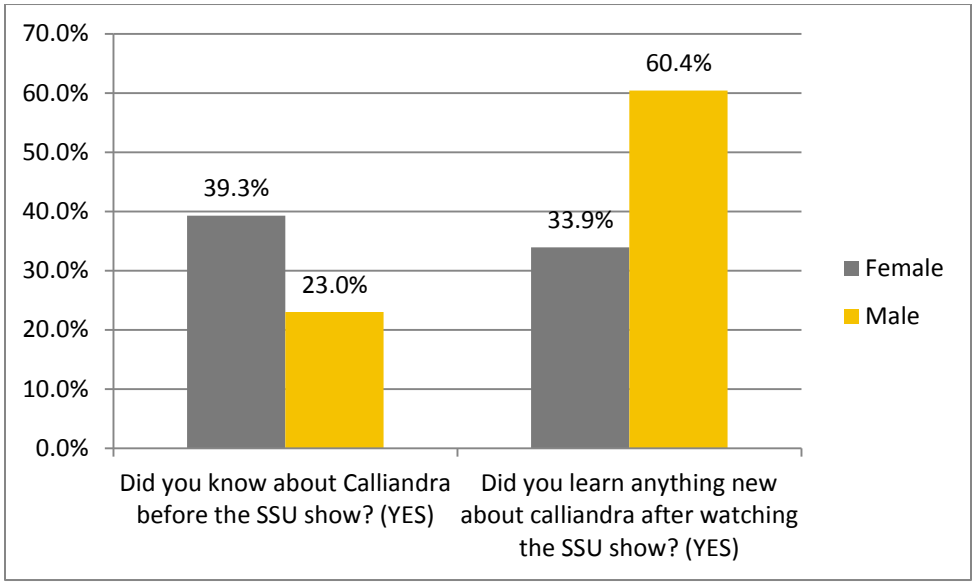

FIGURE 6: KNOWLEDGE ON CALLIANDRA BEFORE AND AFTER THE SHOW

From the postal survey, respondents learnt a number of new things from the show. Among the topics mostly learnt by respondents include: uses of calliandra, how and where to plant calliandra, how to mix calliandra with other livestock feed, calliandra as a source of protein to livestock (Table 7). Comparison between male and female respondents showed that there was no significant difference between themes learnt by males and females, with an exception of only one topic on amount of feed required by a cow per day which was learnt more by male respondents than female respondents

TABLE 7: TOPICS LEARNT ON CALLIANDRA FROM THE SSU SHOW, POSTAL SURVEY

What did you learn from the SSU show?	Male	Female	Total	Chi-square
How and where to plant calliandra	76.3	77.1	76.6	0.982
How to conserve surplus calliandra	59.3	62.9	62.4	0.735
Uses of calliandra	80.0	85.7	84.2	0.463
How to mix calliandra with other livestock feeds	70.4	80.0	75.2	0.266
How to sow calliandra seeds in a nursery	65.9	65.7	68.5	0.928
Height at which calliandra is pruned	68.1	62.9	69.7	0.494
Calliandra as a protein supplement for livestock	79.3	88.6	84.2	0.207
How to calculate the amount of feed required by a cow	45.2	37.1	45.5	0.365
Number of hours/days to soak calliandra seeds before sowing	54.8	54.3	57	0.913
How to prepare nursery bed for calliandra	59.3	60.0	61.8	0.981
The amount of calliandra required to feed a cow/day	63.0	48.6	62.4	0.1*
number of calliandra trees required to feed 1 cow/year	54.1	45.7	54.5	0.343

* Significance at 10%

3.4.4 RATING THE USEFULNESS OF INFORMATION FROM SSU

Respondents were also asked to rate information gained from the SSU show on a scale of 1-5, where 5 is highest gain and score of 1 being least gained. A higher proportion of respondents ranked information gained with a rate of 4 and 5 (Table 8). This means that the information showed on SSU show was thought to be useful and relevant by the viewers.

TABLE 8: RATING KNOWLEDGE GAINED ON USING CALLIANDRA AS LIVESTOCK FEED

Rate (1-5)	Percent N=171
1	7.6
2	7.0
3	29.2
4	32.2
5	24.0
Total	100.0

The ratings of knowledge between male and female respondents did not differ significantly (Table 5). A higher proportion of male and female respondents rated knowledge gained useful (4) and very useful (5) respectively.

TABLE 9: RATING KNOWLEDGE GAINED BETWEEN FEMALE AND MALE FARMERS

Rate knowledge gained from watching the SSU show (1-5)	Gender of respondent		Total
	MALE (%)	FEMALE (%)	
1	6.7	11.4	7.6
2	8.1	2.9	7.1
3	31.1	22.9	29.4
4	31.9	31.4	31.8
5	22.2	31.4	24.1
Total (count)	135	35	170

The respondents were also asked to identify topics that they would like to learn and those that could be shown on SSU. The topics comprised of new topics and those that were not well understood by the respondents. Majority of farmers (74.2%) had something new they would like to know about calliandra. Some of the topics identified by farmers that could be of interest are shown in Table 10. The topics of interest as mentioned by majority of respondents from the postal survey were: "how, when and where to plant calliandra". Farmers wanted to know how to plant calliandra from the nursery stage, how to transplant, how to harvest and frequency of harvest. They also would like to know when and timelines for each of these activities; nursery planting, transplanting and harvesting. About where to plant, most farmers were keen on where calliandra would most flourish i.e. in dry or wet areas and if it can be planted together with other crops and feeds.

TABLE 10: NEW TOPICS IDENTIFIED THAT WOULD BE OF INTEREST TO FARMERS

New topics not shown on the SSU show that are of interest	Number of farmers (n= 171)
How, when and where to plant calliandra	61
Amount of calliandra required per cow and how to calculate these amount	30
How to conserve calliandra	20
Uses of calliandra	18
Sources of calliandra seeds/seedlings	16
Request for leaflets	10
Lifespan of calliandra	8
Mixing calliandra with other feeds	7
Repeat of the SSU shows	6
Advantages of calliandra	4
Calliandra as source of income	4
Diseases affecting calliandra and its control	3
Amount of feed required per cow	1
Calliandra species and varieties	2
Feeding of livestock and requirements for different livestock categories	1
Other fodder crops	1

Farmers also wanted to know the amount of calliandra required per cow per day/year and how this amount is calculated. The respondent farmers were also keen on how to conserve excess calliandra whether through drying or making of silage. Also on ways to making extra income from excess/conserved feeds. A few other farmers wanted to know more about uses of calliandra; whether it has other uses apart from livestock feeds especially to humans, how it can be used to improve soil fertility, mineral content of calliandra and their usefulness, and side effects of calliandra to livestock in case of over eating calliandra.

3.4.5 BEHVIOUR CHANGE AS A RESULT OF WATCHING SSU

The study also sort to find out if farmers changed their farming practices as a result of the SSU show. The majority (76%) of respondents mentioned to have changed a practice or their farming plan as a result of watching the use of calliandra as a source of livestock feed on SSU. More female farmers (80%) indicated that they had changed practices in their farms than male farmers as a result of the show (Figure 7).

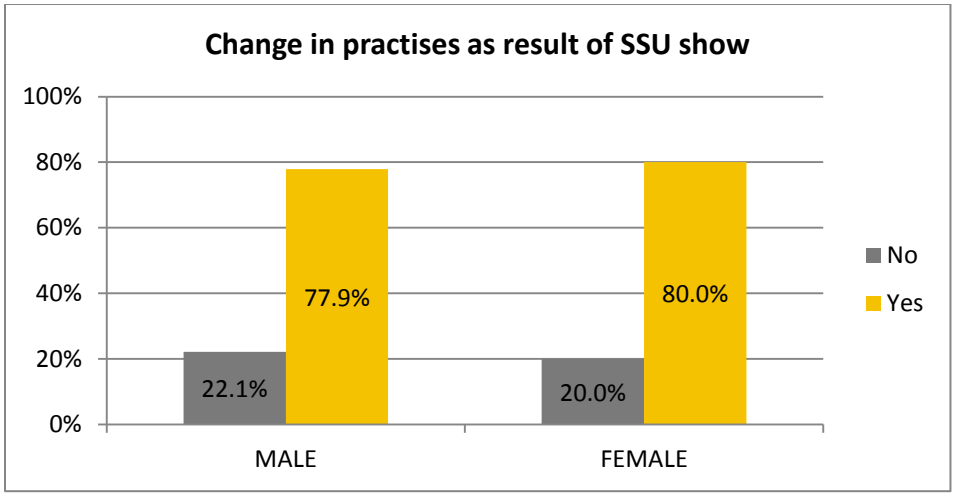

FIGURE 7: CHANGE IN PRACTICES AS A RESULT OF THE SSU SHOW

This difference was however not significant. Only 20% of the respondents did not change their practices. For those that did not change their practices, some of the reasons given include; unavailability of the seeds in the area, not aware of places to find seeds and also because of limited information with regard to calliandra. Reasons given by the respondents for this was that there was limited access to information from the shows, others only listened from a radio device but never watched the show and a few did not receive leaflets for calliandra. Table 11 provides frequencies of responses on reasons why farmers did not make changes.

TABLE 11: REASONS WHY FARMERS DID NOT CHANGE THEIR PRACTICES AFTER THE SSU SHOW

Why farmers did not make any changes in their farming practice	Frequency
Unavailability of seed	25
Not enough information	12
Not practicing dairy farming	10
Did not watch the show	2
Lack of funds and resources	2
Not sure of environmental conditions	2
Poor climatic conditions	1
Part of future plans	1
Did not know how to conserve calliandra	1
Living far from place of farm	1
Not enough space in the land	1
Seedlings damaged before transplanting	1

3.4.6 ACTION TAKEN AFTER WATCHING SSU

Respondents were asked about the action they took after watching the SSU show. Most farmers shared information with other farmers and also recommended the show to other people. Some viewers started watching the SSU show more frequently while others indicated to have started practicing what they learnt on SSU (Figure 8).

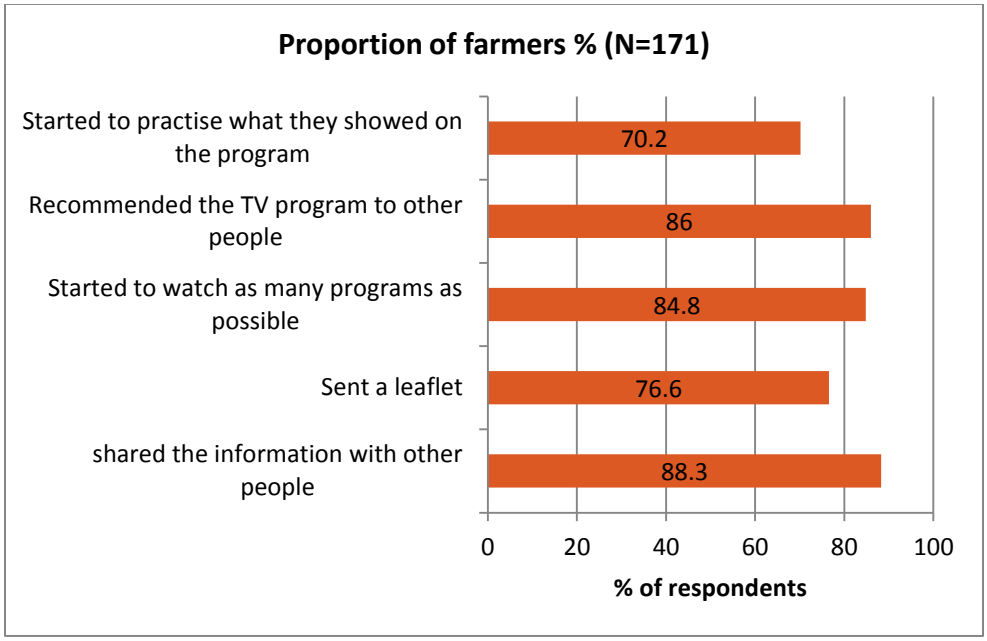

FIGURE 8: ACTION TAKEN AFTER WATCHING SSU

3.5 SMS SURVEY

From the SMS survey, only 22.3% of female respondents were aware of calliandra before the show while 39.3% of males were aware of calliandra before the SSU.

3.5.1 WHAT VIEWERS LEARNT FROM THE SHOW

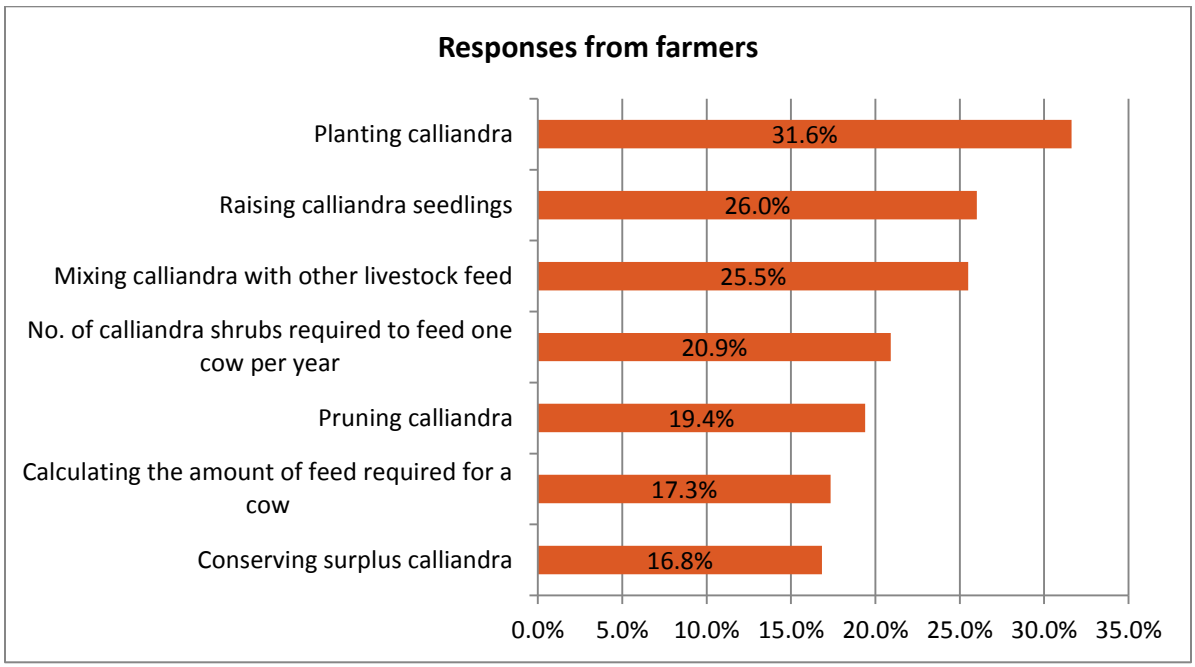

FIGURE 9: WHAT VIEWERS LEARNT FROM THE SSU SHOW

Most farmers learnt about planting of calliandra, raising of calliandra seeds and mixing of calliandra with other livestock feeds (Figure 9). Least learnt by the SMS survey respondents was how to conserve excess feeds.

3.5.2 NEW TOPICS THAT VIEWERS WOULD LIKE TO LEARN

From the SMS survey, farmers were interested in new topics on raising calliandra, number of calliandra shrubs required to feed one cow per year, ways to calculate amount of feeds required for a dairy cow (Figure 10).

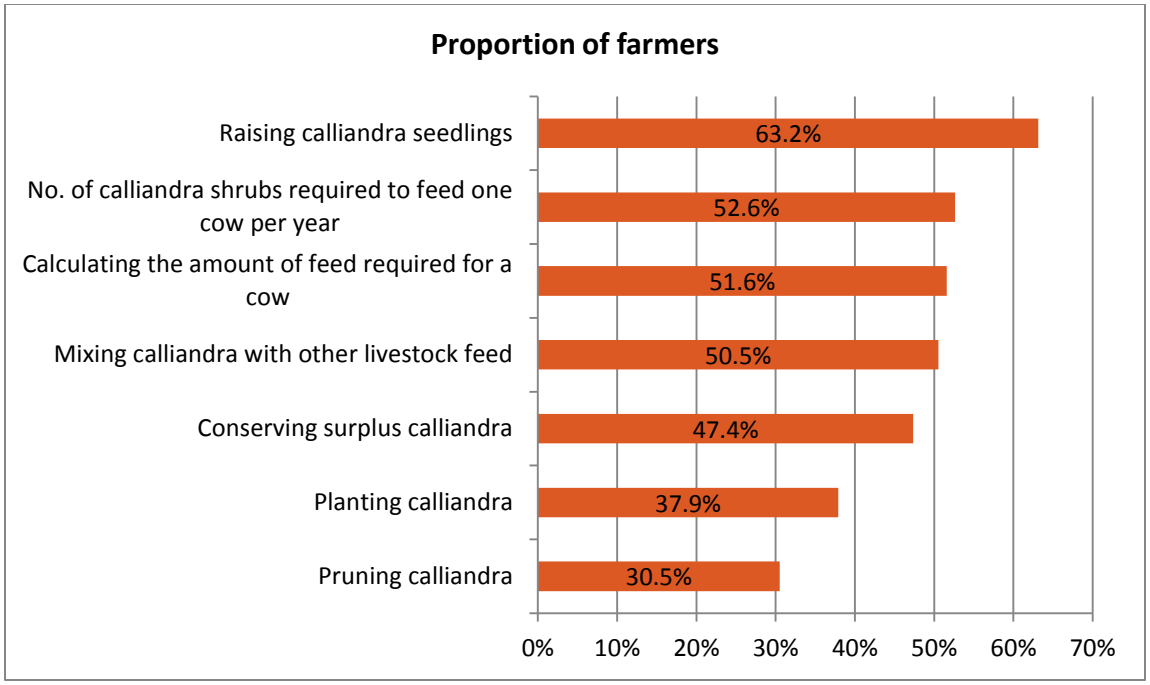

FIGURE 10: NEW TOPICS THAT VIEWERS WOULD LIKE TO LEARN

3.5.3 INFORMATION SHARING BETWEEN VIEWERS

From the SMS based survey, most respondents shared information with other farmers (43.5%), friends (37.4%) and neighbours (35.1% (Figure 11).

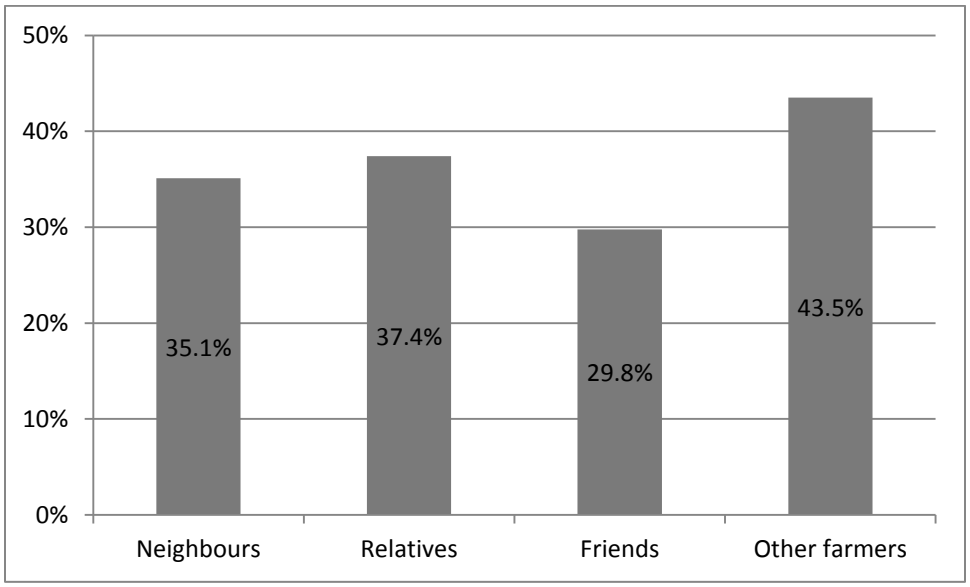

FIGURE 11: INFORMATION SHARING BY VIEWERS

3.5.4 FREQUENCY OF WATCHING THE SSU SHOW

A higher proportion of viewers frequently watched the SSU show and would readily recommend it to others (Figure 12).

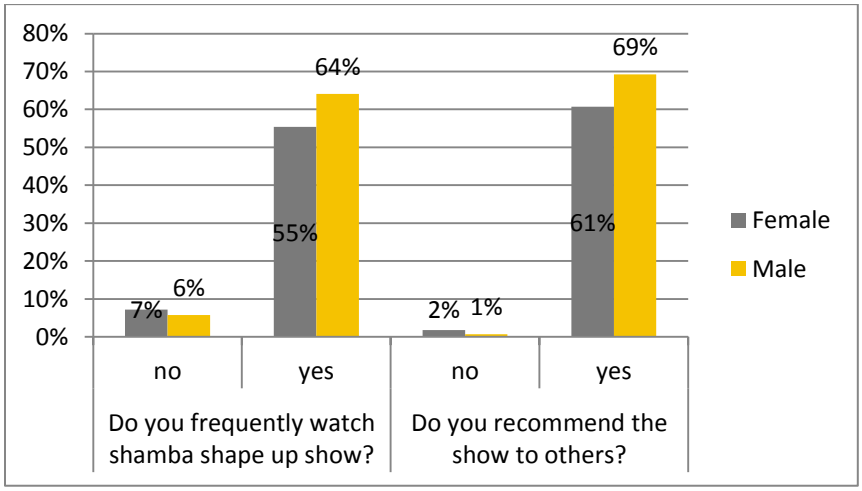

FIGURE 12: FREQUENCY OF WATCHING THE SSU SHOW

CONCLUSION

The success of any extension system whether supply or demand driven, will largely depend on efficiency, timeliness and effectiveness of the information to be applied in farmer situations. TV has the ability to provide timely information and a range of farmer information that is applicable in different climatic and ecological conditions. From the results, viewers from 96% of the counties in Kenya watched the show and wrote back feedback during the aired episodes. The SSU episodes covered a wide variety of farming enterprises and climatic conditions and the shows featuring ICRAF scientists and fodder content were all aired in Series 5. Previous assessment of the viewership of the Mediae Company showed increased number of viewership from series one to other succeeding series broadcast later.

In all the aired episodes feedback was received from more male viewers than females. The feedback messages received also varied in different counties as well as the topics aired in the show. In a previous report by the Mediae Company, higher uptake and impacts of technologies is shown when the subject presented is of interest to farmers

and /or were repeatedly aired severally in the show. For maximum impact, the report suggested that episodes should be aired 5-6 times in a series (Mediae Company, 2013).

All episodes featuring ICRAF scientists focused on fodder shrubs, specifically on calliandra, its importance, planting and management. The fodder content was aired 3 times and each episode concentrated on specific topics on management of calliandra. Very few viewers however specifically wrote back on calliandra. This could likely be attributed to the fact the topic is quite new to viewers and were getting to know it for the first time and also they may be skeptical about its importance as a source of protein for livestock. Although TV can be used as an alternative for information sharing, the information should be tailored to fit the specific audience it intends to reach. Various factors have to be taken into consideration for instance the timing of the show and the target audience. Whereas a higher number of viewers were from urban areas, knowledge received from the show is assumed to be applied to their farms in rural areas. The information aired should also be packaged in a way that farmers both literate and illiterate can understand. Other feedback mechanisms should also be available for farmers who might want to send further questions regarding the content or general farm problems this could then be sent to agricultural extension officers for advice.

The study also aimed at validating the use of the postal and SMS surveys as cost efficient method for data collection. The questionnaires sent via postal survey are filled by farmers and then returned. The SMS based survey is also another way to reach farmers to get them answer questions about their farm without wasting much of their time. The two data collection methods allow farmers flexibility for the farmer to answer questions at their best convenience. The cost for undertaking data collection using the two methods was very minimal. The major drawback of these methods however is that some respondents may fail to recall about the survey and therefore lead to limited feedback. Only 50% of farmers responded to the SMS based survey while only 34% returned the feedback from the postal survey. The other drawback is that the researchers cannot ascertain whether the information given is accurate. The costs are however much lower than undertaking a field survey

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