Effectiveness of the Farmer Trainer Approach in Dissemination of Livestock Feed Technologies: A Survey of Volunteer Farmer Trainers in Kenya

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SUMMARY

This report presents the results of a study that aims to determine the effectiveness of the volunteer farmer-trainer approach in the dissemination of feed technologies in the East Africa Dairy Development (EADD) Project. The starting point of this study is in the recognition that public sector extension services are no longer able to provide small-scale farmers with adequate extension services. As a result, new approaches and mechanisms are being developed to fill the gap. One such approach that is being used by the EADD project is the volunteer farmer-trainer approach (VFTA). It is a form of farmer-to-farmer extension where volunteer farmers are recruited, trained and they in turn train other farmers on improved feed technologies. Although this approach has been in use in the EADD project since its inception in 2008, not much is understood about its effectiveness; hence this study, which examined volunteer farmer-trainers' perceptions, motivations, dissemination activities, competence and the challenges they face as they go about their training and dissemination activities. The study was undertaken in the Central and Rift Valley regions of Kenya. A total of 99 volunteer farmer trainers (VFTs) from seven EADD sites (hubs) were interviewed. The sites were Mweiga, Olkalou, Muki, Kipkaren, Kabiyet, Cheptalal and Longisa.

Findings from the study show that VFTs have served an average of 19 months and train an average of 54 farmers per month. A majority of them undertake their activities by foot (94%), followed by 54% who use hired motorcycles and public transport and 36% use their own bicycles. They cover an average of five villages outside their own. VFTs use various means of mobilizing farmers for their training sessions with the most popular methods being through their dairy management group (DMG) leaders and the use of mobile phones. Popular venues for training sessions are farmer trainee homesteads used by 96% of VFTs, followed by VFTs own homesteads at 93% and demonstration sites that are not at the VFT's homestead at 80%. VFTs are motivated by the desire to gain income (either through their own dairy enterprise or through selling seed or other services) (88%), gain knowledge/skills (87%), altruism (81%), increased demand for training (81%), social benefits (e.g., improved social networks and status) (73%) and 72% project benefits (e.g., exchange visits). Slightly less than half of the VFTs (43%)

keep records on training activities. Slightly over half of VFTs (57%) have training materials (books, brochures, magazines, leaflets).

Nearly all VFTs host demonstration plots which serve as training grounds. The majority of VFTs (79%) have demonstration plots of Napier grasss, fodder shrubs (64%), Rhodes grass (58%), and lucerne (56%). The technology that has been disseminated by the highest number of VFTs is Napier grass (95%), followed by Rhodes grass (80%), conservation of crop residues (79%), silage making (77%), hay making (74%) and fodder shrubs (73%). The least disseminated include giant setaria (10%), lablab (3%), Kikuyu grass (2%), purple vetch (1%) and Guinea grass (1%).

Some of the costs that VFTs incur are: transport, time, opportunity cost for their own labour and bicycle maintenance. Social benefits received in order of importance include; exposure, gaining confidence, increased social networks, and improved social status. Apart from social benefits, half of the VFTs (50%) receive financial benefits by charging for services and selling seed/seedlings while the other half do not. Although the desire to increase their income is a strong motivator, not receiving financial benefits from the sale of seeds and charging for services does not in any way prevent VFTs from undertaking their dissemination activities.

VFTs face many challenges while undertaking dissemination activities, the most frequently mentioned is lack of relevant training materials (98%), limited technical knowledge (95%), high expectations from farmer trainees (93%) and resistance to change by farmers (93%). Other challenges include lack of transport, incentives and local politics. Opportunities for improving the performance of VFTs include provision of training materials, capacity building, exposure, provision of incentives and increased sensitization about the benefits of using improved feed technologies.

VFTs were scored on their knowledge about feeding systems; 0 points were given for incorrect answers, 1 for a partially correct answer and 2 for a correct answer. VFTs averaged 1.69, indicating a fairly solid level of knowledge. Only some VFTs (23%) were able to report on any innovations they have made in the feeding practices they are promoting. Notable innovations

are on propagation, the use of different combinations of feed technologies to make silage and modifications on equipment/structure such as the chaff cutter and the zero grazing unit.

The study indicates the effectiveness of VFTs in promoting the use of feeding system practices in the study area. Studies of those trained by the VFTs and of the importance of VFTs relative to other extension approaches are also needed.

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1.0 INTRODUCTION

It is increasingly acknowledged that public extension services in developing countries are no longer able to meet the changing needs of farmers. As a result, the sector has, over the last decade, been going through a transformative process from the linear model of technology transfer to the more pluralistic demand-driven extension. Despite the transformation, extension in Africa is still faced with many challenges which have been accelerated by structural adjustment reforms aimed at reduced public spending. Some of the challenges include low budgetary allocation, understaffing and low staff morale due to poor remuneration (Kiptot *et al.* 2006; Gautam, 2000). Passivity at the community level and a tendency to treat all farmers, their contexts and needs as homogenous are additional invisible contributions to the failure of state extension programmes (Isubikalu, 2007). It is against this background that the private sector, non-governmental organizations (NGOs) and community-based organisations (CBOs) have stepped in to fill the gap. They are advocating for participatory, demand-driven, client-oriented and farmer-led agricultural extension systems, with emphasis on targeting women and disadvantaged groups. These approaches focus on farmers as the principle agents of change in their communities and, therefore, enhance their learning and empowerment, thereby increasing their capacity to adapt/innovate and train other farmers. The role of extension officers is also changing from agents of technical messages to facilitators who train farmers on entrepreneurship, and link them to markets and credit institutions (Christoplos, 2010). For these new approaches to be institutionalized in the mainstream extension service, they must demonstrate their superiority over old approaches that were abandoned for being ineffective and not taking into account the needs of farmers (Gautam, 200). The new approaches should be accountable to their clients, ensure sustainability and be effective in disseminating new technologies; this is especially crucial in times of scarcity of public funds. One such approach is the volunteer farmer-trainer approach (VFTA) that is being used by the East Africa Dairy Development Project (EADD) to disseminate information/knowledge on feed technologies to dairy farmers in Kenya.

1.1 The volunteer farmer-trainer approach

The volunteer farmer-trainer approach (VFTA) is a form of farmer-to-farmer extension where farmers take centre stage in information sharing. It is envisaged that the farmer-to-farmer extension is a more viable method of technology dissemination as it is based on the conviction that farmers can disseminate innovations better than extension agents because they have an in depth knowledge of local conditions, culture, practices and are known by other farmers. In addition, they live in the community, speak the same language, use expressions that suit their environment and instil confidence in their fellow farmers (Weinand 2002; Sinja *et al.* 2004; Lenoir, 2009; Mulanda *et al*.1999). It works on the basis that the model is able to achieve economies of scale in technology dissemination by reaching more farmers more quickly. This is crucial especially in contexts where government-funded agricultural extension systems are facing budgetary and staffing constraints. The farmer-to-farmer extension has its origins in Guatemala in the 1970s, spreading to Nicaragua in the 1980s, then Mexico and Honduras. It is currently practiced widely in many other countries in Latin America, Asia and Africa in different forms (Weinand, 2002). Farmer-to-farmer extension emerged as a reaction to the top down transfer of technology model that left very little possibility for farmers' participation and initiative, did not address farmers' needs, was inefficient, was biased towards well-to-do farmers and extended inappropriate technologies, leaving behind disinterested farmers and demotivated extension officers (Nagel, 1997). The most famous and well known farmer-to-farmer extension is the "*Campesino a Campesino*" movement in Nicaragua.

At the centre of this approach are farmer trainers who are known by many names in different countries and projects. In Nicaragua, the farmer trainers are known as promoters (Hawkensworth and Perez, 2003); while the International Centre of Insect Physiology and Ecology (ICIPE) in Kenya calls them farmer teachers (Amudavi *et al.*, 2009). In Burkina Faso, farmer trainers are known as farmer advisors (Lenoir, 2009) while in Peru, they are known as farmer extension agents or *kamayog* in the local dialect (Hellin and Dixon, 2008). Selener *et al.*

(1997) defines farmer trainers as individuals with little or no formal education who through a process of training, experimentation, learning and practice, increase their knowledge and become capable of sharing it with others, functioning as extension workers.

Although the farmer-trainer approach differs from country to country due to the conditions under which it takes place, the organisational set up and management, they all have one thing in common: farmer trainers are trained by external agents; they in turn share their knowledge and skills with other farmers in the community. The role of farmer promoters/trainers varies from project to project depending on how they are selected to become trainers, the mode of operation and whether they are volunteers or are compensated for the time they spend training other farmers, whether they work with groups or individuals, whether they are trained as specialists in one subject or as generalists and whether they work in their own community or also conduct trainings outside their community (Scarborough *et al.*1997). The *kamayog* in Peru are paid by their fellow farmers for their services in cash, in kind, or in the promise of future help through an indigenous system known as *'ayni'* (Hellin *et al.* 2006). In contrast, the farmer trainers in the EADD project are volunteers and are, therefore, not paid for their services.

The EADD Project is a collaborative venture between a consortium of partners led by Heifer International, Technoserve, International Livestock Research Centre, and the World Agroforestry Centre (ICRAF). The project started in 2008 with its main objective being to double the incomes of 179,000 dairy farmers in Kenya, Uganda and Rwanda through improved dairy production and marketing. ICRAF leads the project's feeding system component. In order to meet its targets, the project has been using VFTs to disseminate dairy technologies to other farmers within their communities. As of June 2012, EADD had 1443 farmer trainers who are operating in Kenya (Kirui and Franzel 2012).

1.2 Justification for the study

Although the VFTA used by the EADD project has the potential to spread innovations to many farmers within their community, not much is understood about its effectiveness. Several studies have in the past assessed the effectiveness of this model elsewhere, however, the findings are mixed and, therefore, cannot be generalised to the VFTA used by EADD project. This is due to differences in the mode of operation and local circumstances. The *kamoyog* approach in Peru has been reported to be successful partly because the farmer trainers are paid for their services in cash, in kind, or in the promise of future help by their fellow farmers (Hellin *et al.* 2006). In Malawi, Weinand (2002) found that there was a lot of mistrust, jealousy and gossip among farmer trainees because farmers do not believe that the farmer trainers are not compensated for the work they do. This may in future jeopardise the sustainability of the approach. Furthermore, farmer trainers in Malawi are as a matter of fact not different from the master farmers or contact farmers (higher social and economic status) because of the criteria used in selection. What this means is that the poor may still end up being marginalized. In Kenya, Amudavi *et al.* (2009) assessed the technical efficiency of the farmer-trainer approach in the dissemination of the push-pull technology in western Kenya, and their findings were positive, with the approach showing a significant multiplier effect in increasing the push pull technology uptake among farmers. In Peru, the effectiveness of the *kamayog* was measured by assessing the livelihood impact on farmers. The results were positive, i.e. an increase in financial, human and social capital (Hellin *et al.* 2003). The implication of these findings is that every situation is different and for us to understand the effectiveness of the VFTA in the EADD project, it is important that a study be carried out.

1.3 Assessing effectiveness

Several authors have in the past used different methods to assess the effectiveness of the farmer-trainer approach in different countries. Effectiveness can be looked at from different perspectives. Hellin *et al.* (2003) for instance, measured the effectiveness of the farmer-to-

farmer extension approach in the Andes by looking at the livelihood impact of the approach. They used the framework of the sustainable livelihood approach, whereby five indicators (financial, social, human, natural and physical capital) were used to measure the impact of the approach on the livelihoods of farmers. In contrast, Amudavi *et al.* (2009) looked at the technical efficiency of the farmer-trainer approach whereby various parameters were assessed; farmers' knowledge of and skills about the push and pull technology, diffusion and uptake. Weinand (2002) and Lukuyu *et al.* (2012) assessed farmer trainees' perception of the farmer-trainer approach, motivational incentives, technologies disseminated and opportunities and constraints of the approach in Malawi and western Kenya respectively. This study looked at the effectiveness of the approach in terms of:

- the competence level of farmer trainers;
- the number of farmers reached;
- the degree to which the approach builds capacities of farmer trainers to innovate;
- the number and type of feed technologies disseminated and,
- the degree to which women are reached.

In addition, motivational factors influencing the performance of farmer trainers, the challenges, and opportunities were also assessed. It is expected that such information will assist development agencies to design extension programmes that are effective and sustainable.

2.0 OBJECTIVES

1) Identify technologies disseminated by volunteer farmer trainers;

2) Assess the competence level of volunteer farmer trainers;

3) Identify factors that motivate volunteer farmer trainers;

4) Identify challenges and opportunities faced by volunteer farmer trainers

5) Recommend ways of improving the VFTA for effective dissemination of technologies.

3.0 METHODOLOGY

3.1 Selection of volunteer farmer trainers

VFTs in the EADD project were selected on the basis of their interest in developing and disseminating new innovations to their communities after being trained by EADD facilitators. In addition to their interest, they must be good communicators and committed to spreading the use of improved practices in their communities (Kirui *et al.* 2009). They are not paid for their services but benefit from training, seed, and planting material.

The selection of VFTs for the survey was, therefore, based on the length of time the site had been operational. EADD works in 21 sites (hubs) in several districts. The study was, however, undertaken at seven sites, referred to as hubs. These were; Kieni (Mweiga), Olkalou, Muki, Kipkaren, Kabiyet, Cheptalal and Longisa. The VFTs in various hubs were recruited and trained by the EADD project at different times from 2008. Sites selected for the study had recruited their trainers in 2008. By the end of December 2008, EADD had recruited and trained 107 VFTs in Kenya, a third of whom were female VFTs (Kirui *et al.*, 2009). The selection of VFTs for the study was based on the list of 107 VFTs who had been recruited earlier. Due to various reasons such as attrition, illness and commitments, the study interviewed 99 VFTs from Central Kenya and Rift Valley Provinces , some of whom were recruited later to replace those who had dropped out.

Districts

VFTs selected were from two districts in the South Rift Valley province, three in North Rift Valley, five in Central Province and one in Central Rift valley. Respondents interviewed were distributed in different districts as shown in Table 1 and Figure 1.

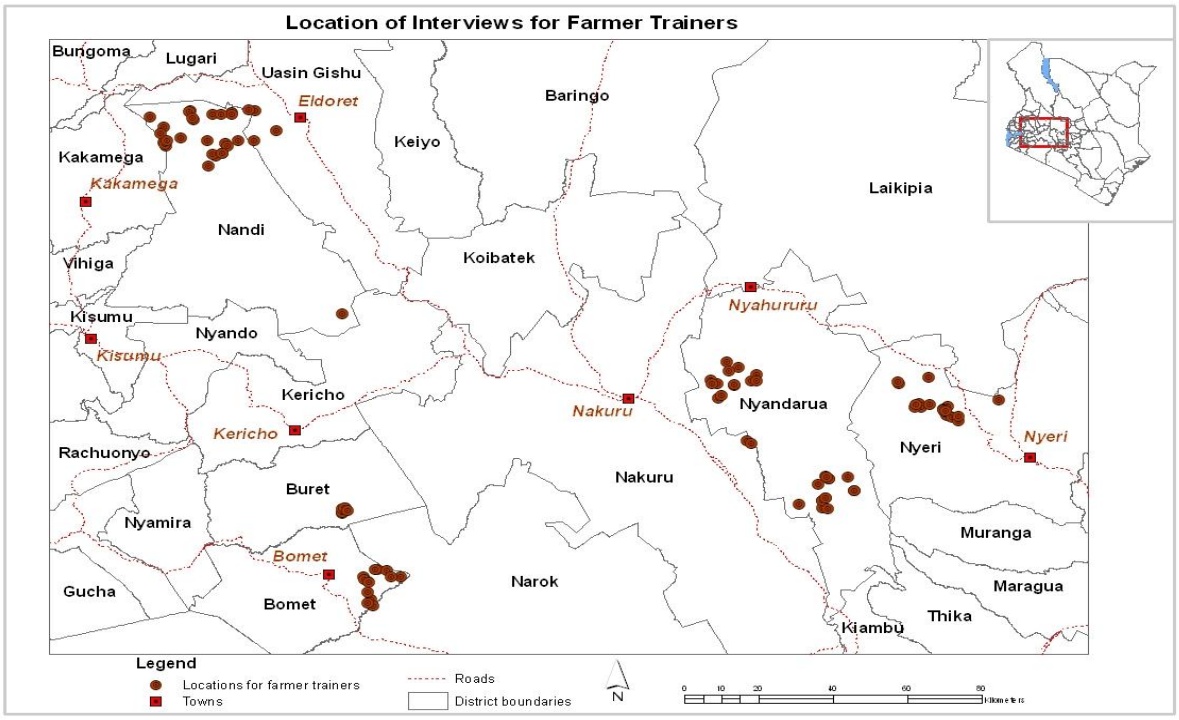

Figure 1: Interview locations

3.2 Description of study sites

The study sites experience different patterns of rainfall. Central province and South Rift Valley have a bimodal type of rainfall with the short rains falling in October to December while the long rains are in March to May. North Rift Valley has a unimodal type of rainfall with a long rainy season and a short dry season between November and February.

All the study sites practice dairy farming with cattle feeding systems ranging from zero grazing (cattle confined and stall fed) to pure grazing where cattle graze freely on private land in paddocks or are tethered (Table 2). Pure grazing is common in the North and South Rift Valley. Zero grazing is prevalent in Central Rift and Central Kenya. The major crops grown in the North Rift regions are beans, maize, sweet potatoes, sorghum, vegetables and fruits such as passion. In the South Rift Valley, the main crops grown are maize, beans, sweet potatoes, bananas, sorghum and finger millet. The main cash crops are tea and pyrethrum (Lukuyu *et al.* 2011). In

Central Kenya and Central Rift, the main crops grown are maize, beans and Irish potatoes. The main cash crops are flowers for export in Nyandarua, onions, peas and carrots.

Table 1: Distribution of volunteer farmer trainers interviewed in various districts

Province	District	Sites (Hubs)	% of farmer trainers interviewed n=99
North Rift Valley	Nandi North	Kipkaren, Kabiyet	27
	Uasin Gishu	Kipkaren	2
	Wareng	Kipkaren	1
South Rift Valley	Bomet	Longisa	12
	Konoin	Cheptalal	7
Central Rift Valley	Gilgil	Olkalou	2
Central	Milanguni	Olkalou	4
	Nyandarua central	Olkalou	9
	Kipipiri	Muki	1
	Nyandarua south	Muki	14
	Kieni west	Mweiga (Kieni)	20

Table 2: Description of study sites

Parameter	Study sites			
	North Rift	South Rift	Central Rift	Central
Rainfall ranges (mm/yr)	900-1300	1000-2020	280-2354	500-1500
Rainfall pattern	Unimodal	Bimodal	Bimodal	Bimodal
Altitude ranges (m.a.s.l)	1800-2500	1000-2000		1800-2500
Main livelihood sources	Wheat, maize, dairy farming	Maize, dairy farming, tea, pyrethrum	Wheat, horticulture, potatoes, beans, dairy farming	Horticulture, dairy farming
Type of cattle feeding system practiced	Zero grazing and grazing	Mainly grazing	Zero grazing	Mainly Zero grazing

Source: Lukuyu *et al.* (2011)**;** Jaetzold *et al.* (2006)

3.3 Dairy cooperative societies

Each VFT interviewed belongs to a milk cooperative society (Table 3). Muki Cooperative Society caters to VFTs from Milangini, Nyandarua south and Kipipiri. Kabiyet Dairies caters to VFTs from Nandi north district while Sot Dairies caters to VFTs from Bomet district. Tanykina Cooperative Society caters to VFTs from three districts: Nandi North, Wareng and Uasin Gishu. Endarasha, Watuka and Mweiga cooperative societies cater to VFTs from Kieni West district. Olkalou cooperative society caters to VFTs from Milangini, Nyandarua Central and Gilgil districts.

Table 3: Number of VFTs interviewed from different cooperative societies across districts

District	Name of cooperative									#	%
	Kokiche	Olkalou	Muki	Kabiyet	Sot	Tanykina	Endarasha	Watuka	Mweiga		
Konoin	7	0	0	0	0	0	0	0	0	7	7
Milangini	0	3	1	0	0	0	0	0	0	4	4
Nyandarua central	0	9	0	0	0	0	0	0	0	9	9
Nyandarua south	0	0	14	0	0	0	0	0	0	14	14
Kipipiri	0	0	1	0	0	0	0	0	0	1	1
Gilgil	0	2	0	0	0	0	0	0	0	2	2
Nandi North	0	0	0	9	1	17	0	0	0	27	27
Bomet	0	0	0	0	12	0	0	0	0	12	12
Wareng	0	0	0	0	0	1	0	0	0	1	1
Uasin Gishu	0	0	0	0	0	2	0	0	0	2	2
Kieni west	0	0	0	0	0	0	8	2	10	20	20
Total	7	14	16	9	13	20	8	2	10	99	

Farmers delivering milk at Tanykina Dairy cooling plant (E. Kiptot)

3.4 Methods of data collection

Formal survey using a structured questionnaire

Collection of data was through a formal survey that was conducted by interviewing individual VFTs using a structured questionnaire. Formal surveys have often been criticized for not being able to capture the perceptions of respondents because questions are designed by researchers and, therefore, responses are to a larger extent influenced by the perspectives of the researcher (Kiptot, 2007). To overcome this limitation, this study first undertook an informal exploratory study whose purpose was to: (i) collect qualitative data from both the VFTs and farmer trainees to be used in formulating hypothesis for a more in-depth formal survey which is the subject of this report; (ii) build adequate rapport with the VFTs and farmer trainees, a fundamental requirement for the subsequent formal survey; and (iii) gain a general understanding of the technologies being disseminated and the perceptions of the VFTs and farmer trainees. The structured formal survey was, therefore, formulated based on the perceptions given by VFTs and farmer trainees during the informal survey. The formal survey was purposively used in this study in order to capture quantitative data that would enable us to understand the factors that influence VFTs' performance, their competence level, motivations, challenges and opportunities so that we are able to come up with strategies to further improve the effectiveness of the VFTA.

Before the questionnaire was administered, the enumerators were trained. This was to ensure that they understood the questions and what was expected of them. After training, a pre-test was conducted with a small sample of VFTs who were not selected for the survey. This was necessary so as to ensure that the enumerators and respondents understood the questions, the enumerators were filling out the responses correctly and to ensure that respondents were able and willing to provide the needed information.

Observation

This is a tool that is not often used in social science research yet it is just as useful as other methods. It is often used to complement both informal and formal surveys. It often brings out issues that may have been forgotten by respondents or is used to countercheck information provided by respondents. This tool was used to assess the condition of observable feed technologies that VFTs had on their farms.

Training of enumerators in Kipkaren (E.Kiptot)

3.5 Data entry, analysis and presentation

Data was entered in statistical package for the social sciences (SPSS). Variables from households and individual VFT characteristics were assessed to capture relevant information from respondents. It was hypothesized that the performance of a VFT may be influenced by a number of explanatory factors. These factors include, age, gender, education level, total number of groups a VFT belongs to, length of time served as a trainer, dairy experience, status of the VFT in his/her group, number of villages the VFTs cover, financial benefits and knowledge

index. Descriptive statistics such as frequency counts, percentages, mean, and standard error of mean were used to display the data. To assess a VFTs' competence level, a knowledge test was undertaken. Twenty questions related to feeds and feeding technologies were formulated and respondents were asked any ten questions. The selection of questions asked depended on the technologies the VFT had learnt and disseminated to other farmers. Scores were given as shown in Table 4.

Table 4: Scores for assessing competence level

Competence level	Score
Incorrect answer	0
Half correct answer	1
Correct answer	2

The total score for the respondent is obtained by summing up the score obtained on each practice. The minimum score one could obtain was 0 and maximum 20. The competence level of the respondents was measured by using the formula below:

Knowledge index=Respondent's total score/Total possible score. The highest possible knowledge index is 1.

Ranking and ratings were also used. VFTs were asked in some cases to simply put various alternatives in order of importance, value or preference. Rating was also done in some cases to give different alternatives some weighting, a 3-point Likert scale where 3 was considered highest with 1 lowest. In other cases, VFTs were asked to assess their own competence level on a 1-5 scale with 1 being the lowest and 5 the highest. Mean ratings for each VFTs competence level per technology were computed and presented.

4.0 RESULTS

4.1 Demographic and socio-economic characteristics of volunteer farmer trainers

The average age of male VFTs interviewed was 46.8 years and female VFTs had an average age of 46.9 years. The difference in age between male and female VFTs was, however, not statistically significant (Table 5). A majority of VFTs (92%) interviewed were married, 2% were widowed, 6% single and none divorced. The ability to set aside land for a demonstration plot is one of the criteria used for the selection of VFTs. Overall average land size for VFTs was 8.9 acres. Male VFTs had an average land size of 9.7 acres while female VFTs had an average of 5.8 acres. The difference in land size between male and female VFTs was statistically significant at $P<0.01$ (Table 5).

The overall average number of groups that VFTs belonged to was 3.0. The average for male VFTs was 2.9 groups while female VFTs belonged to more groups (3.1) than their male counterparts. There was, however, no statistical difference. On average, VFTs had 11.3 years of dairy experience. On segregating data by gender, female VFTs had an average of 7.7 years of dairy experience while their male counterparts an average of 12.2 years. It was statistically significant at $P<0.10$. Basic education has been shown to place farmers in a better position to perceive the potential benefits of improved technologies (Wanyoke *et al.* 2001). It is more important for VFTs to have some basic education because they are required to train other farmers. VFTs interviewed had an average of 10.7 years of schooling with men having an average of 11.1 years while women had an average of 9.0 years. This was statistically significant at $P<0.05$.

It was hypothesized that professional training in any agricultural related field may have an influence on the performance of VFTs. They were asked whether they had any professional training in any agriculture related field such as agriculture, veterinary, animal science/animal production, range management or forestry. The majority (90%) said that they had not received any professional training in any agriculturally related field. Of the 10% of VFTs who have training in an agriculturally related field, four VFTs had a certificate in agriculture; one, a

diploma in agriculture; seven VFTs had professional training in animal science, of which six had trained at certificate level and one at diploma level.

The type of housing in Kenya is normally used as one of the indicators of wealth. Poor farmers normally have mud walled houses with grass used as roof material. Those of average means can afford to buy mabati (corrugated iron sheets) for the roof. The wealthy ones normally have stone walls with corrugated/tiled roofs. Most VFTs interviewed (97%) had houses with corrugated iron sheets and a minority 3% with grass thatched houses. Regarding the wall material, 28% was mud; 15%, bricks; 16%, stone; 29%, timber; 10%, off cuts and 1% was corrugated iron sheets.

4.2 Type and number of livestock owned by respondents

VFTs own different types of livestock. All them owned dairy cows (100%); 25% owned beef cattle; 19%, goats; 55%, sheep; 85%, poultry; 18%, rabbits. VFTs owned an average of three dairy cows, three beef cattle, 11 goats, four sheep, seven chickens and two rabbits (Table 6). None owned pigs.

Table 5: Demographic and socio-economic characteristics of volunteer farmer trainers

Variables	All FT (n=99)			Female FT (n=20)		Male FT (n=79)		Female FT (n=20)	Male FT (n=79)	Chi-square	T-test
	Mean	SE	%	Mean	SE	Mean	SE	%	%		
Age (yrs)	46.8	1.0		46.9	2.0	46.8	1.2				ns
Land size (acres)	8.9	1.1		5.8	0.9	9.7	1.4				***
No. of groups	3.0	0.1		3.1	0.3	3.0	0.1				ns
No of years of dairy experience	11.3	1.1		7.7	2.1	12.2	1.1				*
Education (years)	10.7	0.3		9.0	0.7	11.1	0.3				**
Professional training			10%								
Marital status										**	
Married			92					85	94		
Widowed			2					7	0		
Single			6					5	6		
Divorced			0					0	0		
Type of house(Roof)										ns	
Grass			3					0	3.7		
Corrugated iron sheets			97					100	96.2		
Tiles			0					0	0		
Type of house (Wall)										*	
Mud			28					20	30.3		
Bricks			15					15	15		
Stone			16					30	12.6		
Timber			29					30	29		
Off cuts			10					0	12.6		
Iron sheets			1					5	0		

Notes: Significance level * P<0.10, **P<0.05, ***P<0.01, ns not significant

Table 6: Number and type of livestock owned by volunteer farmer trainers

Livestock type	% of VFTs	Mean	SE
Dairy cows	100	3.2	0.1
Beef cattle	25	3.0	0.1
Goats	19	11.3	3.2
Sheep	55	3.6	0.3
Rabbits	18	1.7	0.9
Chickens	85	7.0	1.4
Pigs	0	0	0

4.3 Livelihood sources

VFTs have various sources of livelihood. All of them (100%) were involved in dairy farming, 93% in subsistence farming (involves the growing of food crops such as maize, beans, potatoes and cabbages); 81%, poultry; and 53%, horticulture (Figure 2). Other sources of livelihood include cash cropping (production of tea in South Rift valley, macadamia nuts in Central Kenya and wheat in Nyandarua district), off-farm casual labour, formal employment, pension, remittances from relatives working in urban areas and abroad, small-scale trade, fish farming, sheep and goat rearing and tree farming for timber production. Horticulture involves the growing of flowers and vegetables for export, common in Nyandarua district. Most livelihood strategies cut across the districts where the study was conducted except fish farming which was found in Nyandarua central, Nyandaru south, Kieni West district and Nandi North. Only one farmer trainer in Nandi North is involved in tree farming for timber production as a source of livelihood (Table 7).

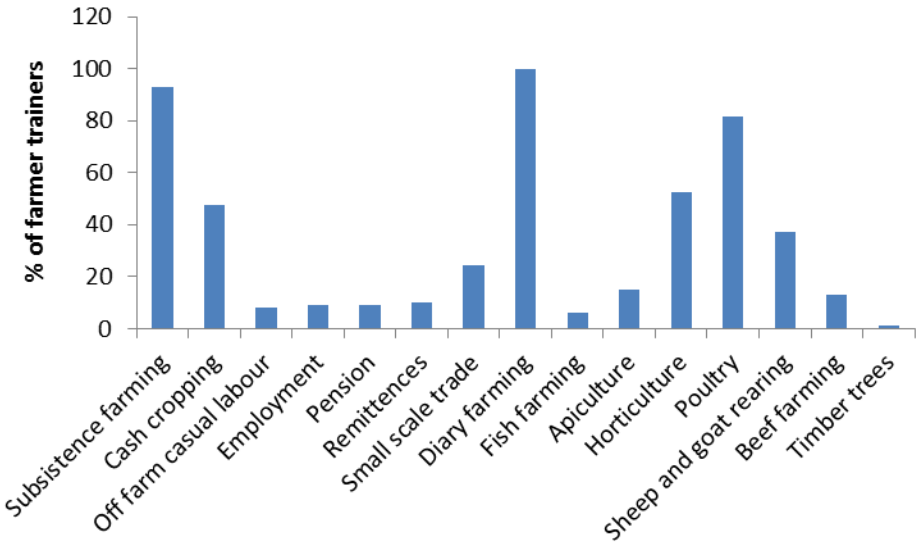

Figure 2: Percentage of volunteer farmer trainers involved in different livelihood sources

Dairy goat rearing in Central Kenya (E.Kiptot)

4.4 Motivation

The majority of VFTs (93%) said that their main motivation to become farmer trainers was to gain knowledge of and skills for improved dairy feed technologies. This was followed by altruism which was mentioned by 85% of VFTs. Another 76% of VFTs were motivated by social benefits that they anticipated receiving by being trainers. These include fame/popularity which

they indicated may be a springboard to leadership positions within the community or even nationally, satisfaction, improvement of their social status and more interaction, hence an increase in social networks. A substantial number of VFTs (71%) had anticipated that they would receive project benefits, such as training, going for tours and exchange visits. The desire to earn an income through providing specialized training to farmers and the sale of seeds was mentioned by 64% of VFTs (Table 8). VFTs were further asked to rate the reasons that motivated them to become trainers on a Likert scale of 3-1 where 3 is very important, 2 important and 1 least important.

The highest rating was for gaining knowledge/skills (2.6), altruism (2.4), social benefits (2.2), project benefits (2.2) and lowest rating was income (2.0). The ratings corroborated the frequency results. Both men and women VFTs were highly motivated to gain knowledge and skills followed by altruism. However, women had higher scores than their male counterparts on altruism.

Motivation to continue training

VFTs were further asked to give reasons that motivate them to continue training other farmers in view of the fact that they are not paid for their services. The majority (88%) mentioned anticipated income. It is interesting to note that although income was not among the most frequently mentioned reasons for becoming a farmer trainer; it was mentioned by the majority of VFTs as a reason that continues to motivate them (Table 9). This is because some of them are now selling seed, fodder and charging for services such as hay baling and silage making. For those not yet doing it, they anticipate being able to sell seed or charge for services rendered in the future.

Table 7: Livelihood sources of VFTs across districts

Livelihood sources	District Frequency												% of FTs
	Konoin	Milan-gini	Nyan-darua central	Nyan-darua south	Kipi-piri	Gilgil	Nandi North	Bomet	Wareng	Uasin Gishu	Kieni west	Total	
Subsistence farming	7	3	9	14	1	2	23	12	1	2	18	92	92.9
Cash cropping	7	3	1	3	0	1	8	10	0	1	13	47	47.4
Off farm casual labour	1	1	1	1	0	0	2	1	1	0	0	8	8.0
Employment	1	1	0	1	0	0	4	2	0	0	0	9	9.0
Pension	1	2	0	1	0	0	3	0	0	0	2	9	9.0
Remittances	0	1	1	1	0	0	1	1	0	1	4	10	10
Small scale trade	1	2	2	0	0	0	9	7	1	0	2	24	24.2
Dairy farming	7	4	10	13	1	2	27	12	1	2	20	99	100
Fish farming	0	0	1	2	0	0	1	0	0	0	2	6	6.0
Apiculture	0	2	1	3	0	0	3	2	1	1	2	15	15.1
Horticulture	2	3	3	6	0	0	18	5	1	2	12	52	52.5
Poultry	5	4	9	10	0	2	21	9	1	2	18	81	81.8
Sheep and goat rearing	1	1	2	4	0	0	10	3	0	0	16	37	37.3
Beef farming	0	1	3	2	0	0	1	4	0	0	2	13	13.1
Timber trees	0	0	0	0	0	0	1	0	0	0	0	1	1.0

Table 8: Percentage of VFTs and mean scores on reasons that motivated them to become trainers

Motivation	% of VFTs	All VFT scores	SE	Male VFT scores	SE	Female VFT scores	SE
Gain knowledge/skills	93	2.6	0.06	2.6	0.07	2.6	0.14
Altruism	85	2.4	0.08	2.3	0.09	2.4	0.20
Social benefits	76	2.2	0.09	2.2	0.09	2.1	0.22
Project benefits	71	2.2	0.09	2.2	0.10	2.0	0.27
Income	63.9	2.0	0.1	2.0	0.19	2.0	0.19

Note: Rating was based on a Likert scale of 3-1 where 3 is very important, 2 important and 1 least important

Gaining knowledge/skills was mentioned by 87% of the VFTs; altruism, 81%; increased demand for training, 81%; social benefits, 73% and project benefits was mentioned by 72% of VFTs. As more and more farmers within the community benefit from the training, there has been an increased demand and this has motivated VFTs to continue training/disseminating dairy feed technologies to other farmers. The fact that more and more farmers are coming to them for training has boosted their self-confidence and has encouraged them to continue training. Further analysis of the importance attached to the reasons was undertaken where VFTs were asked to rate the reasons based on a Likert scale of 3-1. The findings revealed that altruism, gaining knowledge and income were rated highly at 2.5, increased demand for training (2.4), and project benefits and social benefits were both rated at 2.2 (Table 9). Female VFTs scored higher than their male counterparts on gaining knowledge/skills, altruism and on the increased demand for training from fellow farmers.

Table 9: Reasons that motivate VFTs to continue training

Motivation	% of VFTs N=99	Mean scores	SE	Male VFTs (n=79) Scores	SE	Female VFTs (N=20) Scores	SE
Altruism	81	2.5	.073	2.5	0.08	2.6	0.16
Gain knowledge	87	2.5	.068	2.5	0.78	2.5	0.17
Income	88	2.5	.085	2.5	0.09	2.6	0.18
Increased demand for training	81	2.4	.077	2.4	0.09	2.6	0.17
Social benefits	73	2.2	.089	2.2	0.09	2.2	0.28
Project benefits	72	2.2	.0.97	2.2	0.10	2.2	0.24

Note: Rating was based on a Likert scale of 3-1 where 3 is very important, 2 important and 1 least important.

4.5 Training in dairy feed technologies, the institutions that sponsored VFTs and the number of times they have been trained

After recruitment, VFTs are given training on various improved dairy feed technologies and feeding systems by dissemination facilitators, extension officers and other service providers referred to as TOTs (Training of trainers). VFTs interviewed indicated that they had been trained on the establishment and management of about 20 livestock feed species, including fodder shrubs (66%), Napier grass (32%), Rhodes grass (12%), and lucerne (10%)(Table 10). In addition to the fodder species, VFTs have also been trained on feed formulation/rationing (54.5%), silage making (48.5%), hay making (36%) and feed conservation (35%). The institutions that have sponsored VFTs to undertake their training are ICRAF under the EADD Project, Kenya Agricultural Research Institute (KARI), Land O'Lakes, The Netherlands Development Cooperation (SNV), Farmer Agricultural Training Centres (FATC), Ministries of Agriculture and Livestock and agrovets such as Soin Feeds in Rift Valley. A few VFTs have gone out of their way to sponsor themselves to attend various training sessions on livestock feed technologies in

agricultural training colleges such as Baraka agricultural college and Wambugu Farmers Training Centre (Table 10). The majority of VFTs have been trained at least once on most technologies while a few have been trained two or three times (Table 11).

4.6 Assessment of training needs of VFTs

VFTs were asked how their training needs were identified. The majority (72%) said that their assessment of training needs was a consultative process between VFTs and dissemination facilitators, while 23% said that their training needs were decided by the EADD project and 3% did not know and 2% said it was decided by others such as TOTs (Figure 3).

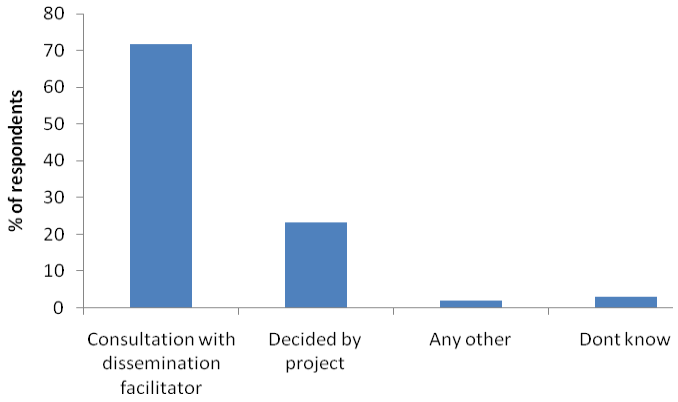

Figure 3: How the training needs of VFTs were identified

4.7 How training needs of farmers are identified

The majority of VFTs (84%) make consultations with other farmers before training. Another 12% of VFTs decide on their own which topics to train for. VFTs argued that there are some livestock feed technologies that farmers are not aware of and therefore it is only logical that these topics are introduced to them without consultation. A few VFTs (4.0%) indicated that some topics are decided by the EADD project.

Table 10: Percentage of VFTs who have been trained in various dairy feed technologies

	Institution that sponsored training										% of FTs
	ICRAF/ EADD	MUKI Co-operative	MOA/ MOL	SNV	FATC	SOIN FEEDS	SELF	LAND O'LAKES	KARI	Total #	
Fodder shrubs	57	2	3	2	0	0	1	1	0	66	66.6
Feed formulation	47	0	6	1	0	1	0	1	1	57	57.5
Silage making	45	0	3	1	0	0	0	0	0	49	49.4
Hay making	34	0	4	0	0	0	0	0	0	38	38.3
Feed conservation	34	0	3	0	1	0	0	0	0	38	38.3
Napier grass	28	1	3	0	0	0	0	0	0	32	32
Rhodes grass	12	0	0	0	0	0	0	0	0	12	12.1
Lucerne	10	0	0	0	0	0	0	0	0	11	11.1
Sorghum	6	0	1	0	0	0	0	0	0	7	7.0
Tree Lucerne	6	0	0	0	0	0	0	0	0	6	6.0
Desmodium	5	0	0	0	0	0	0	0	1	6	6.0
Columbus grass	4	0	0	0	0	0	0	0	0	5	5.0
Oats	5	0	0	0	0	0	0	0	0	5	5.0
Hay baling	2	0	0	0	0	0	0	0	0	2	2.0
Edible cana	2	0	0	0	0	0	0	0	0	2	2.0
Purple vetch	1	0	0	0	0	0	0	0	0	1	1.0
Giant setaria	1	0	0	0	0	0	0	0	0	1	1.0
Lablab	1	0	0	0	0	0	0	0	0	1	1.0
Lupine	1	0	0	0	0	0	0	0	0	1	1.0
Nursery establishment	1	0	0	0	0	0	0	0	0	1	1.0
Sweet potato vines	1	0	0	0	0	0	0	0	0	1	1.0

NB: ICRAF = World Agroforestry Centre; EADD = East Africa Dairy Development Project; MOA = Ministry of Agriculture;
MOL = Ministry of livestock; SNV = The Netherlands Development Cooperation; FATC = Farmer Agricultural Training
Centre; KARI = Kenya Agricultural Research Institute

Table 11: The number of times VFTs have been trained in feed technologies

	Number of times trained											Total (N=99)	% FTS
	1	2	3	4	5	6	7	8	10	12	20		
Fodder shrubs	24	7	12	8	8	2	1	1	1	1	0	65	65.6
Feed formulation	19	17	7	3	5	1	0	1	1	0	0	54	54.5
Silage making	17	16	6	4	2	0	0	1	1	1	0	48	48.5
Hay making	18	10	4	2	1	0	0	0	0	1	0	36	36.3
Feed conservation	13	10	3	4	1	1	0	2	0	1	0	35	35.3
Napier grass	19	4	2	5	1	0	0	0	0	0	1	32	32.3
Rhodes grass	7	1	1	3	0	0	0	0	0	0	0	12	12.1
Lucerne	6	2	0	2	0	0	0	0	0	0	0	10	10.0
Sorghum establishment	2	3	0	2	0	0	0	0	0	0	0	7	7.0
Tree Lucerne	3	3	0	0	0	0	0	0	0	0	0	6	6.0
Desmodium	1	1	1	2	1	0	0	0	0	0	0	6	6.0
Oats	5	0	0	0	0	0	0	0	0	0	0	5	5.0
Columbus grass	3	0	0	1	0	0	0	0	0	0	0	4	4.0
Hay baling	2	0	0	0	0	0	0	0	0	0	0	2	2.0
Edible cana	0	0	0	2	0	0	0	0	0	0	0	2	2.0
Purple vetch	0	0	0	1	0	0	0	0	0	0	0	1	1.0
Giant setaria	0	0	0	1	0	0	0	0	0	0	0	1	1.0
Lablab	1	0	0	0	0	0	0	0	0	0	0	1	1.0
Lupine	1	0	0	0	0	0	0	0	0	0	0	1	1.0
Nursery establishment	1	0	0	0	0	0	0	0	0	0	0	1	1.0
Sweet potato vines	0	0	1	0	0	0	0	0	0	0	0	1	1.0

4.8 Mobilization of farmers for training sessions

As part of their dissemination activities, VFTs normally organize training sessions to train farmers on dairy feed technologies. Various means of contacting farmers are used. The most popular is the use of cell phones (90%) and publicizing through local dairy management group (DMG) leaders (81%). Others include door-to-door visits, announcing during training sessions, public gatherings (immunization, chiefs' meetings/barazas), use of poster adverts and sending letters inviting farmers to attend training sessions (Figure 4).

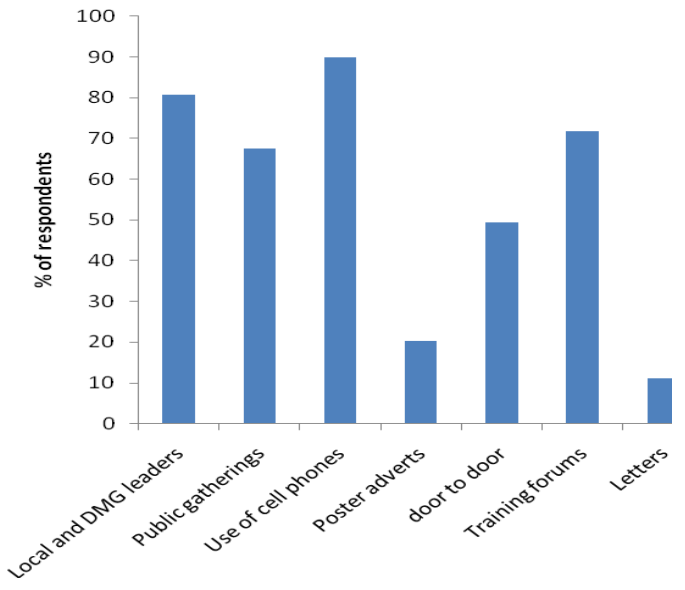

Figure 4: Percentage of VFTs using various means for mobilizing farmers

Mobilization of training sessions by gender of the VFT

The most popular methods used by male VFTs for mobilizing farmers for training is the use of cell phones and publicizing through their local and DMG leaders; this was mentioned by 86% of the male VFTs. On the other hand, all female VFTs (100%) interviewed use cell phones for mobilizing farmers while 70% use training sessions to announce when the next training is going to take place (Table 12).

Rating of methods for mobilizing farmers to attend training sessions:

VFTs were asked to rate various methods used in mobilizing farmers for training sessions on a Likert scale of 3-1 where 3 is very important, 2 is important and 1, least important. Publicizing during training sessions had the highest rating of 2.46, followed by publicizing through DMG leaders (2.39). The third was the use of cell phones that had a rating of 2.31. The lowest rating was letters at 1.64 (Table 13).

Table 12: Mobilization of training sessions by gender

	Gender	
How farmers are mobilized	% male VFTs (n=79)	% of female VFTs (n=20)
Publicize through DMG leaders	86	60
Publicize through public gatherings	68	60
Use of cell phones	86	100
Poster adverts	22	10
Door to door	49	50
Training sessions	72	70
Letters	11	5

4.9 Venues for holding training sessions

The most popular venue for holding training sessions is the farmer trainee's homestead (used by 96% of VFTs), followed by the VFTs' own homesteads at 93%. Other venues include demonstration sites that are far from the VFTs' homesteads and public venues, such as schools and churches (Figure 5).

Table 13: Rating of methods for mobilizing farmers to attend training sessions

How farmers are mobilized to attend training sessions	N	Mean rating	SE
Announce during training sessions	70	2.46	0.33
Publicize through local and DMG leaders	80	2.39	0.09
Use of cell phones	89	2.31	0.08
Publicize through public gatherings	67	2.07	0.09
Poster adverts	20	1.85	0.18
Door-to-door	49	1.69	0.12
Letters	11	1.64	0.28

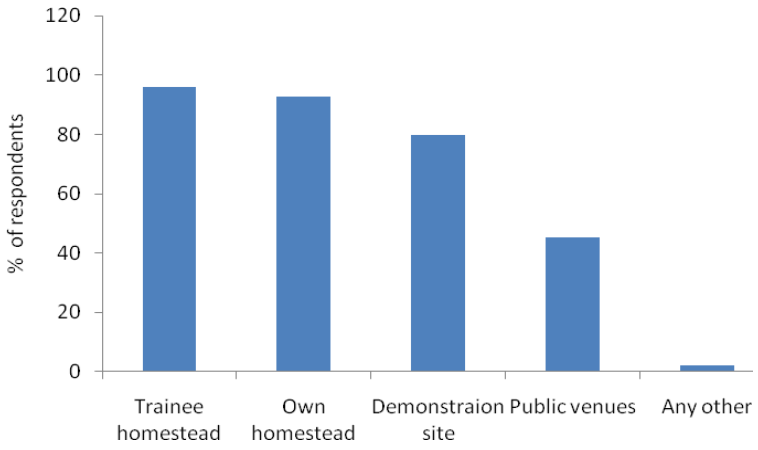

Figure 5 : Percentage of VFTs using various venues for training sessions

Rating of most frequently used venues by VFTs:

VFTs were further asked to rate the three most frequently used venues on a Likert scale of 3-1. Demonstration site and trainee homestead had the highest mean ratings at 2.38 and 2.37 respectively. The VFT's homestead was third with a rating of 2.14 (Table 14).

Table 14: Rating of three most frequently used venues

Venue	% of farmer trainers	Mean rating	SE
Demonstration site	80	2.38	0.289
Trainee homestead	96	2.37	0.083
Volunteer farmer trainer homestead	93	2.14	0.08
Public venues	45	1.98	0.131
Any other	2	1	-.

4.10 Dissemination activities by VFTs

VFTs cover an average distance of 6.85 km a day when undertaking their dissemination activities of which men cover an average of 7.28 km while women cover an average of 5.15 km. There was, however, no statistical difference between the distances covered by men and women trainers even though men cover longer distances (Table 15).

On average VFTs interviewed have served 18.9 months with men having served an average of 18.8 months while women have served an average of 19.6 months. There was however no statistical difference. The EADD project began its operations in late 2008 and, therefore, it follows that VFTs have served for less than 36 months considering that there was time spent recruiting and training VFTs. Further analysis revealed that slightly over half of the VFTs interviewed (54%) have served between 21-25 months, 18% between 11-15 months, 9% between 16-20 months, 8% had served 6-10 months, 7% had served less than five months, and a minority (4%) have served between 26-36 months.

There are some VFTs who go out of their way to train farmers outside their own villages. VFTs cover an average of 4.8 villages outside their own. Male VFTs cover more villages outside their own than their female counterparts. Women cover an average of three villages while men cover about twice as many villages (5.0). T-test statistic showed a significant difference at $P<0.10$.

During the dry season, VFTs offer training an average of 2.5 times a month, whereas during the wet/rainy season, they train an average of 2.3 times a month. Women, on average train 2.4 times a month both in the dry and wet season. Men, on the other hand, train 2.5 times during the dry season and 2.3 times in the wet season. There were, however, no statistical differences between the number of times women and men VFTs train during both the dry and wet seasons.

On the days VFTs train, they spend on average, about 1.9 hours per day. Women spend an average of 1.8 while men spend slightly more time at an average of 1.9 hours.

Table 15: Descriptive statistics on the dissemination activities undertaken by VFTs

Variables	All VFTs (n=99)		Female VFTs (n=20)		Male VFTs (n=79)		T-test
	Mean	SE	Mean	SE	Mean	SE	
Length of time served as farmer trainers (months)	18.9	0.79	19.6	1.59	18.80	0.90	ns
Longest distance covered (km)	6.7	0.69	5.2	1.0.	7.28	0.82	ns
No. of villages covered outside their own	4.8	0.62	2.80	0.40	5.3	0.76	*
Number of times per month FT trains during the dry season	2.5	0.11	2.35	0.26	2.52	0.13	ns
Number of times per month FT trains during the rainy season	2.3	1.4	2.35	0.310	2.28	0.15	ns
Time (hrs) spend on dissemination	1.9	0.10	1.80	1.2	1.9	0.9	ns
Number of male farmers trained	148.2	43.1	65.25	22.4	169.2	53.6	ns
Number of female farmers trained	154.0	73.2	61.35	20.01	177.5	91.5	ns
Farmers trained per month	54.0	11.2	56.05	11.9	53.4	11.9	ns
Total number of farmers trained	302	112	126	37.5	346	140	ns

Notes: Significance level * P<0.10

Table 16: Frequency distribution of number of farmers trained per month

No. of farmers	N	Percent
1-20	58	58.6
21-30	11	11.1
31-40	7	7.1
41-50	2	2.0
51-60	6	6.1
61-70	2	2.0
71-80	1	1.0
91-100	3	3.0
101-600	9	9.1

There was no statistical difference between the number of hours men and women VFTs spend on dissemination activities per day. The average total number of male farmers trained is 148. Male VFTs have trained an average of 169 male farmers, while female trainers have trained an average of 65 male farmers. However, there was no statistical difference. The average total number of female farmers trained is 154. Male VFTs have trained an average of 177 female farmers while female VFTs have trained an average of 61 female farmers. However, there was no statistical difference. The average number of farmers reached per month is 54 (Table 15). The median number of farmers reached per month was about 20, with the majority (58%) of VFTs training 1-20 farmers (Table 16). A few (9%) of VFTs trained several hundred farmers, skewing the average. On segregating data by gender, female VFTs reached an average of 56 farmers per month, whereas male VFTs reached 53 farmers per month. Although female VFTs reach more farmers per month, there was no statistical difference between the two groups. So far, VFTs have trained a total average of 302 farmers in 19 months, with 48.8 % training between 1 and 50 farmers. A few (5.1 %) trained over 700 farmers skewing the average (Table 17).

Table 17: Frequency distribution of total number of farmers trained

Total no. of farmers trained	N	Percent
1-50	48	48.4
51-100	11	11.1
101-200	16	16.1
201-300	7	7.1
301-400	3	3.0
401-700	9	9.1
>700	5	5.1

4.11 Follow up visits

VFTs were asked whether they make follow up visits after training. The majority (92.9%) make follow up visits while a minority (7.1 %) do not make follow ups. VFTs who made follow up visits were asked about the criteria they used to make follow ups. The majority (65.2%) do it as part of their duty while 31.5% do it after they receive requests from farmers. Few VFTs (3.3%) do it after consulting with the farmer. VFTs were asked whether they keep records on training activities. Slightly less than half the respondents (43%) keep training records in note books while the majority (57%) does not keep records on training/dissemination activities. Records kept include date of training, attendance, venue and topics/activity involved in. In terms of whether they have training materials, slightly over half of the VFTs (56.6%) have training materials which include brochures, leaflets, books, and newsletters. Out of these, 30.4 % share the training materials with other farmers, 53.6 % use them for reference only and another 16% indicated that the materials are both for reference and sharing with the farmers they train.

4.12 Mode of transport owned and used by VFTs

Although slightly less than half of the VFTs (42%) own bicycles, 25% motorcycles and 12% motor vehicles (Table 18), the majority of VFTs (94%) walk, followed by 54% who use a hired motorcycle and public transport (Table 19). It is important to note that all male VFTs who own motorcycles use them as mode of transport during their dissemination activities. Although female VFTs walk most of the time, they also occasionally use hired motorcycles and public transport (Table 19).

Table 18: Transport owned by farmer trainers

Transport owned	Overall %	#Male (n=79)	#Female (n=20)
None	29	22	7
Bicycle	42	36	6
Motorcycle	25	20	5
Tractor	8	7	1
Motor vehicle	12	8	4
Donkey/oxen cart	19	16	3
Wheel barrow	2	2	0

NB: There were multiple responses

Table 19: Mode of transport used by VFTs

	Overall % of VFTs		
Mode of transport used	N=99	#Male(n=79)	#Female (n=20)
Foot	94	73	20
Hired motorcycle	54	40	13
Public transport	54	41	12
Own bicycle	36	34	2
Own motorcycle	22	20	2
Hired bicycle	10	8	2
Own motor vehicle	8	6	2

Table 20: Ranking of three most frequently used mode of transport

Transport	Ranking of the first three most frequently used (# of VFTs) Most frequently used	Moderately used	Least frequently used	Total frequency	Total score	Overall rank
Foot	64	23	5	92	427	1
Hired motorcycle	7	23	19	49	184	2
Own bicycle	15	21	3	39	168	3
Public transport	5	11	31	47	162	4
Own motorcycle	4	8	10	22	82	5
Hired bicycle	2	6	4	12	46	6
Own vehicle	2	0	3	5	19	7

NB: Rank 1 given score 5, Rank 2 score 4, Rank 3 score of 3

VFTs were asked to rank the three most used modes of transport when undertaking their dissemination activities. Based on scores given to the three modes of transport most frequently used, where most frequently used was given a score of 5, moderately used a score of 4 and least frequently used a score of three, a total sum of scores was computed and the highest score was considered the most frequently used mode of transport. Based on the overall ranking, walking by foot ranked one, hired motorcycle was ranked second and the use of their own bicycles ranked third, while public transport was ranked fourth (Table 20).

4.13 Hosting of demonstration plots by VFTs

Demonstration plots on farm play an important role in technology dissemination. Most VFTs host demonstration plots which serve as training grounds for farmers. As such, it was important

that we find out whether VFTs have demonstration plots of various technologies. The majority of VFTs (78.8%) have demonstration plots of Napier grass (Table 21). This is followed by fodder shrubs (63.6%), Rhodes grass (57.6%), and Lucerne (55.6%). There are, however, some technologies that have only a handful of farmers (less than 20%) with demonstration plots. These include Sudan grass (14%), Nandi setaria (12%), edible cana (11%), giant setaria (8%), Guatemala grass (9%), Kikuyu grass (2%), lablab (2%), purple vetch (1%), Guinea grass (1%).

4.14 VFTs' assessment of their own competence level

Different VFTs have disseminated various livestock feed technologies. They were asked to assess their own competence (knowledge) level of various technologies/practices they had disseminated. Rating was on a 5 point Likert scale where 5 was for very high, 4 - high, 3 - intermediate, 2 - low and 1 - very low. VFTs' competence levels are shown in Table 21. Napier grass was rated highly (4.14). Other technologies that had a rating of 3.5 and above were hay making (3.89), oats (3.86), and conservation of crop residues (3.77), silage making (3.67), Lucerne (3.53) and Kikuyu grass (3.50). Technologies in which VFTs had low competence levels that were rated 3 and below were giant setaria (3.0), edible cana (2.86), Guatemala grass (2.69) and lablab (2.3).

4.15 Dissemination of feed technologies

The technology that has been disseminated by the highest number of VFTs is Napier grass (94.9%) followed by Rhodes grass (79.7%), conservation of crop residues (78.7%), silage making (76.7%), hay making (74%), and fodder shrubs (72.7%). At the bottom of the table are technologies that have been disseminated by less than 50% of VFTs (Table 21). These include oats (49.4%), Columbus grass (42.4%), Sudan grass (22.2%), Nandi setaria (15%), edible cana (14%), Guatemala grass (13%), giant setaria (10%), lablab (3%), Kikuyu grass (2%) and Guinea grass (1%).

A demostration plot of sweet potato vines (E.Kiptot)

Table 21: VFTs' competence level, demonstration plots, implementation and longevity of practice

Technologies	Competence level	% of farmer trainers who have taught (n=99)	SE	% of farmer trainers with demonstration (N=99)	% of farmer trainers who have implemented on farm N=99	Longevity of practice (months)	*N*	SE
Napier grass	4.14	94.9	0.095	78.79	86.87	54.86	90	7.81
Guinea grass	4	1	-	1.01	1.01	132	1	-
Hay making	3.89	74	0.123	-	-	28.1	67	2.43
Oats	3.86	49.4	0.175	42.42	42.42	37.96	48	6.02
Conservation of crop residues	3.77	78.7	0.115	-	-	32.41	70	4.35
Silage making	3.67	76	0.13	-	-	27.38	69	2.94
Lucerne	3.53	66.6	0.123	55.56	57.58	29.73	62	3.21
Kikuyu grass	3.50	2	0.5	2.02	2.02	9.5	2	2.50
Sweet potato vines	3.49	61.6	0.147	49.49	50.51	20.21	58	2.31
Boma Rhodes	3.48	79.7	0.119	57.58	68.69	28.8	76	3.67
Nandi setaria	3.47	15	0.274	12.12	13.13	22.5	14	3.48
Fodder shrubs	3.46	72.7	0.114	63.64	57.58	20.83	70	1.57
Sudan grass	3.36	22.2	0.268	14.14	15.15	19.11	19	2.82
Sorghum	3.34	68.6	0.14	50.51	54.55	19.03	61	1.75
Desmodium	3.30	56.5	0.142	42.42	44.44	24.12	52	1.87
Feed formulation	3.22	67.6	0.141	-	-	25.17	58	2.25
Columbus grass	3.07	42.4	0.194	31.31	33.33	25.36	39	5.56
Giant setaria	3.0	10	0.494	8.08	8.08	24.9	10	2.97
Edible cana	2.86	14	0.312	11.11	12.12	25.5	14	3.78
Guatemala grass	2.69	13	0.365	9.09	11.11	28	13	4.79
Lablab	2.33	3	0.333	2.02	1.01	28	3	4.00

4.16 Beyond demonstration to expansion on the farm

Some VFTs have moved beyond demonstration plots and expanded the technologies on their farms (Figure 6). For example, 87% of VFTs have expanded Napier grass on their farms, 68.7% Rhodes grass, 55.6% Lucerne, 54.6% sorghum, 57.6 % fodder shrubs, 42.4% oats among other technologies (Table 19). Technologies that have been expanded by few farmers are Sudan grass (15%), Nandi setaria (13%, edible cana (12 %), Guatemala grass (11%), giant setaria (8%), Kikuyu grass (2%), Guinea grass (1%) and lablab (1%). Technologies that have more farmers expanding on their farms are Rhodes grass, Napier grass, Nandi setaria, Columbus grass, Lucerne, sorghum, sweet potato vines, desmodium, edible cana, Sudan grass, Guatemala grass (Figure 5). It is important to note that as for the case of fodder shrubs, there were more VFTs with demonstration plots than those who have expanded the technology on their own farms.

4.17 Longevity of practice and where VFTs learnt/received the technologies from

The average length of time VFTs have served was about 18.9 months and yet some of them have had the technologies for longer than this. The longest time is for Guinea grass (132 months), Napier grass (54.9 months), followed by oats (37.9 months), Rhodes grass (28.8 months). The average shortest time is Kikuyu grass (9.5 months).

Before the inception of EADD, some VFTs had various dairy feed technologies which they received from various sources. Notable institutions from where they obtained the technologies are the Ministry of Agriculture, various NGOs such as Land O' lakes and the Netherlands Development Cooperation (SNV), neighbours, agricultural shows, schools and universities such as Baraton and Egerton (Table 20). More than half of the VFTs interviewed (55%) had Napier grass before the inception of the EADD project, 22% of VFTs had Rhodes grass and oats grass, 21% Lucerne, another 21% already knew how to make silage, and 22% knew how to make hay, among other technologies (Table 22).

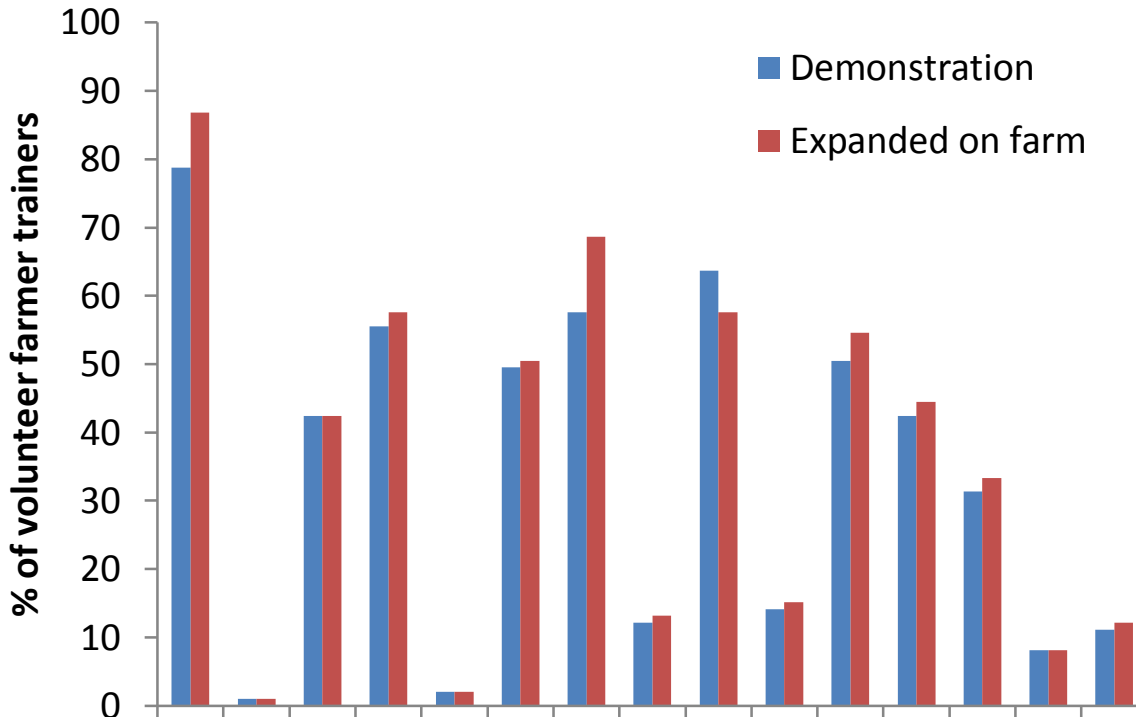

Figure 6: Comparison of % of farmer trainers with demonstration plots and those who have expanded to their fields

Table 22: Where VFTs learnt/received the technologies from

	Where taught received technologies from															
	Neighbours	MOA	MUKI COOP	SNV	Baraton	MLD	KARI	FTC	LAND O' LAKES	FTC	ASK show	Secondary school	EGER	Relative	Githunguri Dairy	% of VFTs
Napier grass	14	21	1	1	2	4	1	1	3	4	1	0	0	1	1	55
Hay making	2	10	2	0	0	2	0	1	2	2	1	0	1	1	0	24
Rhodes grass	5	8	0	1	0	2	0	1	1	1	1	1	0	1	0	22
Oats	8	9	1	0	0	0	0	0	1	1	1	0	0	1	0	22
Lucerne	2	9	1	0	0	2	0	1	3	1	0	0	0	1	0	21
Silage making	0	9	2	0	1	1	0	0	5	0	0	0	1	2	0	21
Conservation of crop residues	5	7	0	0	0	3	0	1	2	1	0	1	0	0	0	21
Feed formulation	3	5	0	0	0	2	1	1	1	0	1	1	0	0	0	15
Desmodium	1	4	0	0	0	1	0	1	3	0	0	0	0	1	0	11
Fodder shrubs	0	6	0	0	0	0	0	0	3	1	0	0	0	0	0	10
Columbus grass	1	4	0	0	0	0	0	0	2	0	0	0	0	2	0	9
Sweet potato vines	0	6	0	0	0	1	1	0	1	0	0	0	0	0	0	9
Sorghum	0	6	0	0	0	0	1	0	1	0	0	0	0	0	0	8
Sudan grass	2	3	0	0	0	0	0	0	1	0	0	0	0	0	0	6
Nandi setaria	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Guatemala grass	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0	4
Edible cana	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	3
Giant setaria	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2

Abbreviations: MOA = Ministry of Agriculture, COOP = Cooperative society, SNV = The Netherlands Development Cooperation, MLD = Ministry of Livestock Development, KARI = Kenya Agricultural Research Institute, FTC = Farmer Training Centre, ASK = Agricultural Society of Kenya, EGER = Egerton university

4.18 VFT innovations

Only a minority of VFTs (23%) reported having modified the technologies they learned about. The innovations include using splits to plant sorghum, lucerne and Rhodes grass instead of the traditional method of using seeds. Another notable modification is the use of a combination of vetch and Napier grass in making silage, the use of herbicides before planting Rhodes grass and propagating tree Lucerne using cuttings instead of seeds (Table 23).

Table 23: VFT innovations

Innovations	percentage of volunteer farmer trainers (n=99)
Use of splits in planting Rhodes grass	4
Use of plastic tanks for silage making	3
Using different fodders to make feed formulation	3
Digging of trenches when planting Napier grass	2
Modification on the zero grazing unit	2
Using different ways of preserving feeds	2
Broadcasting Rhodes grass using mosquito nets	2
Modification on the use of chaff cutter	1
Modification on the feed store	1
Use of herbicides before planting Boma Rhodes	1
Use of chicken manure as a pesticide on fodder shrubs	1
Making silage from a combination of vetch and Napier grass	1
Use of splits to plant sorghum	1
Use of splits to plant Lucerne	1
Propagating tree Lucerne using stem cuttings	1

4.19 Testing VFT knowledge

Testing the knowledge/competence of the VFT on feed technologies is an important aspect in determining whether or not VFTs are competent enough to train other farmers. If VFTs do not

have sufficient understanding of what they are disseminating/training, then there is the real danger of farmers taking up technologies without sufficient technical knowledge on how to establish and manage them, thereby leading to poor performance. Each VFT was asked ten questions which were based on the technologies that they had disseminated. A VFT who got an incorrect answer was given a score of 0; half correct, a score of 1 and a correct answer, a score of 2. The maximum is 20 with the minimum being 0.

An analysis of the results shows that the test question that had the highest mean score was about the best time to harvest maize fodder for making silage which had 1.95 (Table 24). Maize is a staple crop in Kenya, and many dairy farmers use it to make silage. The lowest mean score (0.67) was for the question on whether or not Nandi setaria is a perennial or annual grass. Other questions that had a low rating are: the recommended number of fodder trees to be left on farm for seed production, in areas with two rainy seasons, the best season to sow Rhodes grass, and reasons why mulberry trees should not be planted with food crops. When data were segregated by gender, there was no statistical difference between the knowledge level of male and female VFTs (Table 25).


Rhodes grass


Tube silage


Sorghum

Table 24: Mean score of various test questions

Test questions	Mean	N	SE
Best time to harvest maize fodder for silage	1.95	81	.105
How Napier grass is established	1.94	31	.045
Any shrub used for fodder	1.88	32	.059
How Napier canes are planted	1.87	45	.077
Best time to sow Rhodes grass	1.85	34	.086
Best stage to cut Rhodes grass for hay	1.85	33	.088
Materials needed to make tube silage	1.85	81	.043
Name one type of silage	1.83	84	.050
Best time to cut Napier grass for making silage	1.78	67	.056
What are suitable niches for growing fodder shrubs	1.78	69	.068
How Napier splits planted	1.73	64	.071
How Calliandra seeds pre-treated	1.73	41	.071
Best time to harvest oats for silage making	1.69	45	.077
Whether Nandi setaria is perennial or annual	0.67	3	.667
No. of Calliandra shrubs per cow per year	1.46	65	.105
Recommended spacing for Calliandra for a hedge	1.54	57	.090
No. of Calliandra shrubs per cow per year	1.46	65	.105
Recommended ratio of soil to manure in the Tumbukiza method	1.21	29	.152
Reasons why mulberry shouldn't be planted with food crops	1.18	11	.296
No of gunny bags of freshly cut Rhodes grass required by a cow/day	1.13	16	.221
Recommended no. of fodder trees to be left on farm for seed production	1.10	49	.114
In areas with two rainy seasons, best season to sow Rhodes grass	1.10	10	.277
Overall	1.69		.020

Table 25: Differences in scores and knowledge index by gender

	Gender	N	Mean	SE	Sig (2-tailed) t-test
Total score	Male	781	1.68	.022	ns
	Female	200	1.67	.044	
Knowledge index	Male	79	.8418	.01492	
	Female	20	.8425	.02745	ns

4.20 Costs incurred and benefits received

Type of costs incurred by VFTs when undertaking their dissemination activities are shown in Figure 7. The most frequently mentioned cost is time (97%) with the least mentioned being training materials (47%). VFTs spent their own money on training materials such as manila paper, sample seeds and marker pens.

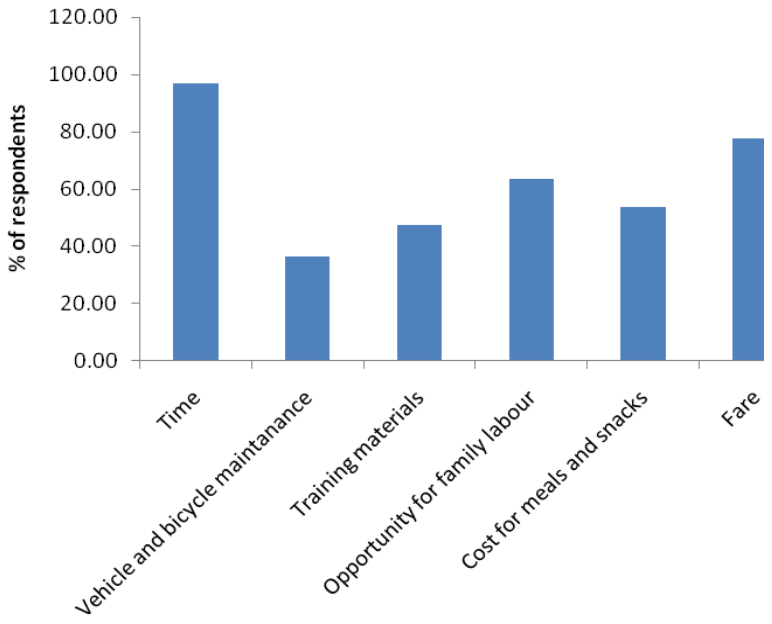

Figure 7: Percentage of VFTs who incur various costs during training/dissemination

Although VFTs incur costs when undertaking dissemination activities they also receive benefits which we classified into two categories: social and financial. The main social benefits they receive were grouped into four. They include exposure (getting an opportunity to see/learn new technologies), gaining confidence, increased social networks and improved social status. A pair-wise matrix ranking exercise undertaken by VFTs revealed that exposure ranked highest, followed by gaining confidence, increased social networks and fourth ranked was improved social status (Table 26).

Table 26: A pair-wise matrix ranking of social benefits received by VFTs

Social benefits	Ranking of the social benefits							Estimate	SE
	1	2	3	4	Total	Score*	Overall rank		
	Number of farmers								
Exposure	29	37	17	16	99	376	1	0.000	0.000
Gaining confidence	36	21	11	31	99	359	2	-0.175	0.144
Increased social networks	18	19	49	13	99	339	3	-0.380	0.145
Improved social status	16	22	22	39	99	312	4	-0.659	0.147

* In order to compute scores for the pair-wise matrix, the ranks were given scores as follows; 1=5, 2=4, 3=3, 4=2. The scores were multiplied by the frequencies and total score computed. The highest score was ranked 1

Apart from the social benefits, about half of the farmer trainers (49.5%) receive financial benefits by charging for services and selling seed and seedlings of various feed technologies (Table 27). Seed sold includes oats, lupin, Rhodes grass, sorghum, Columbus among others shown in Table 25. Seedlings sold are mainly for Calliandra species, a fodder shrub. Cuttings sold are for Napier grass and sweet potato vines. VFTs have various units for measuring seed, cuttings and charging for services; these include mgs, kg, 300ml cup, 90kg gunny bag, 20kg gunny bag, a tonne, day, hour, and so on. The average price for tree seedlings such as Calliandra is KSh10.50 per seedling.

Table 27: Financial benefits received by VFTs

Service/technology	% of VFTs (n=99)	Unit cost	Mean price per unit(KSH)	SE
Lupin seeds	4	100 mgs	457	204.87
Lupin seeds	2	300ml cup	45	5
Lucern seedlings	2	seedling	7.50	2.50
Calliandra seedlings	12	seedling	10.50	1.27
Calliandra seeds	1	100mgs	100	-
Hay	1	90kg gunny bag	400	-
Hay	14	bale	211.43	13.66
Hay baling	5	bale	118	54.26
Silage making	12	tonne	958.33	231.74
Silage making	1	day	2000	
Chuff cutter services	2	90kg gunny bag	450	150
Chuff cutter services	7	hour	588	169.9
Chuff cutter services	1	day	900	-
Chuff cutter services	4	tonne	500	0
Ear tagging	11	head	80	14.6
Dehorning	6	head	141	20.07
Training farmer groups	1	day	500	.
Oats seeds	3	90kg gunny bag	1666	166.67
Desmodium vines	1	bundle	5	.-
Sweet potato vines	2	bundle	12.50	7.5
Sweet potato vines	2	90kg gunny bag	700	-
Sweet potato vines	3	piece	1	0
Purple vetch seeds	3	100mgs	150	57.74
Rhodes seeds	11	kg	529	120.80
Rhodes seeds	1	20 kg gunny bag	500	-
Sorghum seeds	8	kg	167.5	31.95
Columbus seeds	5	kg	210	18.70
Sunflower seeds	1	kg	100	.
Napier canes	7	canes	11	6.54
Tree Lucerne seeds	1	100mgs	100	.

bag or sold as a piece. One piece sells at an average of KSh1, a bundle is sold at an average of KSh12.50. They also charge for services such as silage making at an average cost of KSh968 per

Sweet potato vines are either sold in bundles, 90kg gunny tonne, hay baling is charged at KSh 118 per hour, chuff cutter hire services are charged at KSh588 per hour. Services or seeds/seedlings that have over 10% of VFTs receiving financial benefits include Calliandra seedlings, hay, silage making, ear tagging and Rhodes grass seeds.

4.21 Challenges VFTs face as they undertake dissemination/training activities

VFTs face many challenges when undertaking their training/dissemination activities. The most frequently mentioned challenge is lack of relevant training materials (reference materials, manila paper, sample seeds, pens, note books etc.) mentioned by 98% of VFTs; 95% mentioned limited technical knowledge; high expectations from trainees and resistance to change by farmers were mentioned by 93% of VFTs interviewed (Figure 8). Other challenges include lack of fare/transport, lack of incentives and local politics (some farmers within the community incite other farmers not to participate in any training that does not provide lunch and give allowances to participants).

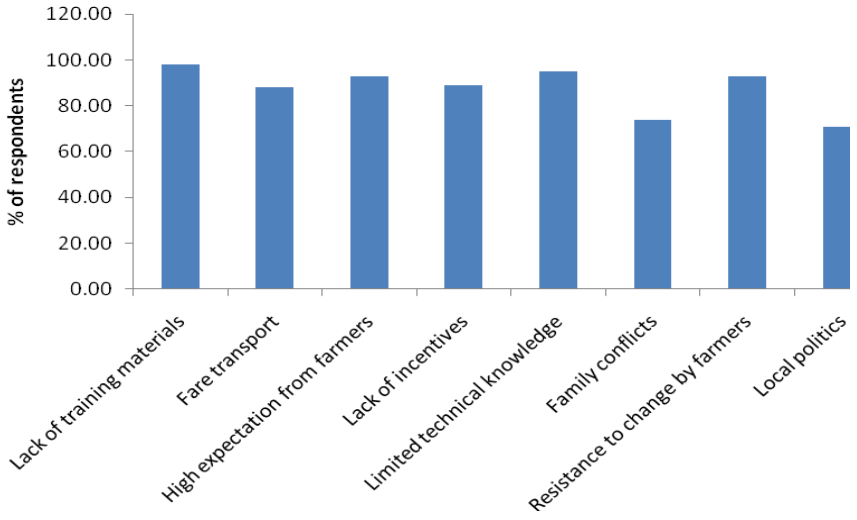

Figure 8: Percentage of VFTs facing various challenges

Ranking of challenges affecting the performance of VFTs

In order to show the magnitude of relative importance of the challenges VFTs face, they were asked to rank them. The highly ranked challenge that affects their training/dissemination activities is the lack of training materials, followed by limited technical knowledge, high expectation from farmers, fare, resistance to change by farmers, family conflicts and, lastly, local politics (Table 28).

Table 28: Overall ranking of challenges facing VFTs

Challenge	Frequency								Total scores	Rank
	1	2	3	4	5	6	7	8		
Lack of training materials	380	216	104	42	72	15	0	3	832	1
Limited technical knowledge	100	135	136	140	54	50	24	21	660	2
High expectation from farmers	140	90	152	126	90	25	36	6	665	3
Fare /transport	170	171	104	56	102	35	8	12	658	4
Resistance to change by farmers	100	90	104	140	78	75	36	6	629	5
Lack of incentives	60	126	152	112	60	95	12	3	620	6
Family conflicts	20	45	32	21	36	50	60	84	348	7
Local politics	30	18	8	7	48	55	104	54	324	8

NB. In order to compute scores for each rank, the ranks were given scores as follows; 1=10, 2=9, 3=8, 4=7, 5=6, 6=5, 7=4, 8=3; which were then multiplied by the frequencies received by each rank, total scores were computed and the highest score was ranked 1 overall.

4.22 Opportunities to improve the performance of VFTs

In order to improve the performance of the VFTs, various challenges faced need to be addressed. Opportunities include capacity building and provision of training materials which were mentioned by about 97% of VFTs. Training materials include reference books, brochures and magazines, such as Organic Farmer. Other materials are pens, manila paper, flip charts, and so on. Other opportunities are: exposure to new knowledge (exchange tours), provision of incentives and branding which involves having a certification system where VFTs are given recognition based on their experience and performance, for example giving them bags, T-shirts and caps with the project logo (Figure 9).

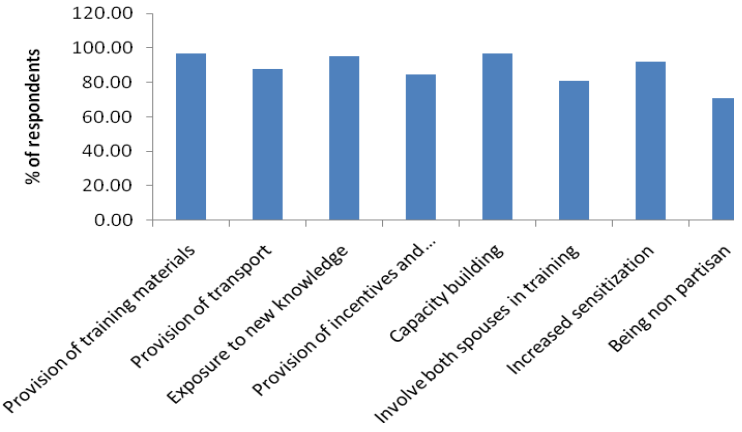

Figure 9: Opportunities for improving the performance of VFTs

In order to show the magnitude of relative importance of the opportunities mentioned, VFTs were asked to rank the opportunities that can be explored in order to improve their performance as trainers. Further analysis used scores to compute overall ranking. Exposure to new knowledge through exchange visits and tours had an overall ranking of number one followed by provision of training materials, such as reference books/brochures and third was capacity building (more training workshops conducted on various feed technologies (Table 29).

Table 29: Overall ranking of opportunities to improve the performance of VFTs

Opportunities	Frequency								Total scores	Overall rank
	1	2	3	4	5	6	7	8		
Exposure to new knowledge (exchange visits/tours)	270	180	104	77	90	60	60	0	841	1
Provision of training materials	240	162	120	119	78	30	8	3	760	2
Capacity building (Training workshops)	120	207	136	90	60	25	16	12	666	3
Increased sensitization)	30	108	152	119	102	85	20	3	619	4
Provision of transport	120	126	96	63	66	65	44	15	595	5
Provision of incentives and branding	90	81	104	77	90	60	60	0	562	6
Involve both spouses in training	10	27	64	49	72	90	64	45	421	7
Being non partisan	30	9	0	14	30	25	64	114	286	8

NB. In order to compute scores for each rank, the ranks were given scores as follows: 1=10, 2=9, 3=8, 4=7, 5=6,6=5, 7=4, 8=3; and multiplied by the frequencies. Computation of overall rank was based on total sum scores.

4.23 Enumerators' assessment of the status of livestock feed technologies on farm

After the end of the interviews with VFTs, the enumerators visited farms to assess the condition of the technologies that were available (Table 30). Technologies were rated as excellent, good, or not good. 'Not good' technologies were full of weeds, affected by drought and frost and, in some cases, overgrown. They were also rated as 'not good' if the area allocated to them was very small. The three highest rated technologies were hay, silage, and conservation of residues, each of which was rated excellent on over 50% of the fields. The technologies that had the highest 'not good' ratings and were cultivated on over ten farms were desmodium and Nandi setaria, which were rated as 'not good' on over 40% of the fields. Desmodium was affected by frost and drought and was often not well established. Nandi setaria had poor germination and was often affected by weeds. Although VFTs are making an effort to conserve crop residues and hay, storage is a constraint. Quite a number of VFTs store the crop residues under trees; others cover it with polythene sheet in the open air, which is not sufficient to keep the crop residues and hay from rotting and from sustaining damage from rodents and termites.

An enumerator assessing the performance of a VFTs' tree Lucerne hedge (E.Kiptot)

Table 30: Status of dairy feed technologies on-farm

Technology	N	% not in good condition	Comments	% Good Condition	Comments	% Excellent	Comments
Rhodes grass	65	26	Weedy, poor germination, overgrazed, overgrown, affected by drought,	34	Has a few weeds	40	Well managed
Napier grass	92	17	Weedy, overgrown, affected by frost, waterlogged	37	Needs gapping	46	Well managed
0ats	37	11	Weedy, affected by drought	46	Need to be harvested	43	Well managed, not affected by frost
Nandi setaria	12	42	Poor germination, weedy	42	Need harvesting	17	Well managed
Columbus grass	31	26	Poor regrowth due to drought	45	Area very small	29	Well managed
Lucerne	47	28	Withered because of dry season, poor germination	45	Area small	28	Well managed
Sorghum	44	27	Affected by drought and frost	32	Area small	41	Well managed
Fodder shrubs	57	28	Overgrown, need lopping	46	Very few trees	26	Well managed
Sweet potato vines	53	28	Affected by frost and drought	40	Small area	32	Well managed, different varieties
Desmodium	39	51	Affected by frost and drought, not well established	28	Small area	21	Intercropped with Napier
Lablab	2	50	Affected by drought	0	-	50	Well managed
Edible cana	9	56	Affected by frost	22	Small area	22	Well managed
Sudan grass	12	25	Weedy	50	Small area	25	Well managed
Giant setaria	5	40	Weedy	20	Area small	40	Well managed
Guatemala grass	8	25	Weedy	50	Not affected by drought, area small	25	Well managed
Silage	40	18	Not well covered	28	Polythene destroyed	55	Well fermented, stored for 4 years, tube silage, bunker silage, silage in plastic tanks, sweet potato silage, well preserved
Hay	45	9	Not well stored, left in the open	31	Covered by polythene sheet but prone to adverse weather conditions	60	Stored in a well-ventilated store
Conservation of crop residues	50	8	Stored under a tree	40	Covered by polythene but could be affected by termites	52	Well kept in a store

5.0 DISCUSSION

This study has clearly demonstrated that the use of volunteer farmer trainers in extension is an approach that should be highly promoted as it has the potential to spread technologies to many farmers within a short period of time. In this study, VFTs were able to reach an average of 54 farmers per month and an average of 302 farmers in 19 months. This is indeed remarkable considering that they undertake their dissemination activities mostly by foot and without a salary. What motivates them? This study has brought new insights on the issue. Before becoming farmer trainers, farmers were motivated by various reasons which include gaining knowledge/skills, altruism, project benefits, social status and income. After about three years disseminating/training without pay, income was mentioned by the majority of VFTs, followed by gaining knowledge/skills, altruism, increased demand for training, social benefits and project benefits scored last. However, when they were asked to rate them, altruism and gaining knowledge/skills received the highest rating, followed by income. It is important to note here that about half of VFTs have increased their income through the sale of seeds, seedlings, fodder products, cuttings and charging for services rendered. However, not receiving financial benefits did not stop the remaining half of the VFTs from undertaking dissemination activities. Other factors such as altruism and gaining knowledge/skills are the greatest motivator for VFTs. What is clear here is that VFTs are motivated by personal and community interests. Personal interest is about improving themselves socially, economically and building their capacities. Altruism is mainly about taking care of community interests. French philosopher Auguste Comte coined the word *altruism* in 1851 in which he believed that the only moral acts were those intended to promote the happiness of others. VFTs are of the conviction that by training others to use improved practices, the standards of living within the community will improve.

"If you have food and your neighbour does not have, he will steal it from you. So why not impart skills that can help everyone?" This was a question posed to me by one of the VFTs.

Their desire is to alleviate poverty by transforming the community through the use of improved agricultural practices. It gives them a sense of satisfaction when they see their efforts of

training others bearing fruit. Altruism among VFTs in Kenya is both cultural and biblical (being your brother's keeper) and, hence, the desire to improve the community at large. It is also important to note that as more and more farmers realise the benefits of using improved feed technologies, the demand for training has also increased. This in itself has given VFTs the confidence and motivation to train.

Follow up visits after training is an important component of any training programme. This study has established that the majority of VFTs make follow up visits to monitor the progress of farmers and give advice on technical issues. Although they are strong in making follow ups, this study has further established that VFTs do not put a lot of emphasis on record keeping. Keeping records should be an integral component of any training programme. Training that is provided with written supportive and/or corrective feedback, enables VFTs to know on what aspects to make follow up visits and to plan accordingly. It is, therefore, important that dissemination facilitators in the EADD project develop a participatory template for record keeping that can be used by VFTs during training and when making follow up visits. This is necessary for effectiveness of the volunteer farmer-trainer approach.

Regarding the VFTs' own assessment of their competence level, findings from this study show that VFTs had different levels of competence as regards to various feed technologies with many of them rating themselves highly on some technologies while a few very low. Technologies with worryingly low competence levels among VFTs include giant setaria, Guatemala grass, lablab and edible cana. The low competence level may be linked to the fact that a substantial number of farmers have not received sufficient training on these particular technologies. Findings on the training VFTs have received in the past indicate that a lot still needs to be done. Technologies that have had less than 10% of VFTs trained include tree Lucerne establishment and management, hay baling, sorghum establishment, desmodium establishment, edible cana establishment and management, purple vetch, Columbus grass, giant setaria, oats, lablab, lupine, nursery establishment and management, mineral supplementation and sweet potato

vines. More training is, therefore, required on these particular technologies in order to improve VFTs' competence level.

Testing of VFTs' knowledge further revealed that the average competence level is 1.69 with the highest possible competence level being 2.0. The competence level was based on technologies that VFTs had disseminated to farmers. The highest competence level recorded was on the question on the best time to harvest maize fodder for silage that had a mean score of 1.95. The lowest score was on the question about Nandi setaria with a mean score of 0.67. One of the challenges mentioned by VFTs was limited technical knowledge about some technologies, Nandi setaria being one them, judging by the VFTs' competence level. This means that there needs to be continuous training of VFTs in order to improve their knowledge of and skills on various technologies. The training should be carried out based on an outcome of a training needs assessment. This study has shown that, although a substantial number of VFTs (72%) were trained after consultations had been undertaken with dissemination facilitators, 23% of VFTs were given training without their training needs being assessed. In order to provide appropriate training to VFTs, it is imperative that a training-needs assessment be carried out so that specific training is organised to target certain groups of VFTs based on their training requirements. The training can be undertaken in collaboration with other institutions that have an interest in the dairy sector since this study has clearly shown that various VFTs have had contacts with other institutions such as KARI, Ministry of Agriculture, Ministry of Livestock, Land O'Lakes, SNV and local universities among others. By collaborating with other institutions in training, duplication of efforts will be minimised and costs will be cut down considerably.

In addition to limited technical knowledge on some feed technologies, this study has shown that VFTs face other challenges. Most notable are: lack of training materials, high expectations from farmers, transport and resistance to change by farmers. For the VFTA to be effective, these challenges need to be addressed. Suggestions given by VFTs are that the project needs to provide training materials in the form of reference books/magazines/ brochures. Other materials include manila paper, flip charts and marker pens. Although the EADD project is

already providing training materials, they are not sufficient as some VFTs do not have them. To cut down on costs, training materials, such as reference books, can be shared among farmers in various groups and, at the same time, EADD can link up with other institutions/NGOs in the dairy industry to provide training materials.

High expectations from farmers is a common challenge when dealing with donor-funded programmes. There is the perception that donor-funded projects have money and, therefore, farmers expect to be paid whenever they are called upon for training. Weinand (2002) in her study of farmer-to-farmer dissemination in Malawi also found out that there was a lot of gossip and jealousy among farmer trainees because they did not believe that VFTs are not paid for the work they do nor are they not given money to take care of farmers' expenses. Dissemination facilitators, extension officers and VFTs need to take the initiative in sensitizing farmers to appreciate the importance of training which is for the purpose of imparting knowledge/skills so that they can improve their livelihoods and it is not an opportunity to make money, except in the long run with improved products. Attitudes do not change overnight, but gradually we may see situations where farmers meet the costs of training and participate even for reasons other than securing lunch and a transport refund.

This study has shown that VFTs cover long distances which in future may be counterproductive as they may not be able to effectively make follow ups or monitor closely the performance of the technologies on farmer trainees' farms. Because of the long distances, they end up hiring motorcycles, bicycles or even taking public transport thus incurring expenses which are not refunded. Possible suggestions to address this challenge would be for their DFBA's to provide bicycles to them through a check off system. Another option is for the EADD project to increase the number of VFTs so as to reduce the distance each one has to cover.

Mobile phone technology is presenting VFTs with an unprecedented opportunity to mobilize many farmers for training within the shortest time possible. Use of mobile phones and

publicizing through DMG leaders were the two most popular methods used for mobilizing farmers. This clearly shows that VFTs have also embraced the use of information communication technology in their work and they should be highly encouraged in order to save on costs and time. They do this by sending text messages to farmers informing them about the date, time and venue of the training. It is important to note that all female farmer trainers (100%) used mobile phones to mobilize farmers compared to 86% of their male farmer counterparts.

The findings of this study have shown that female VFTs have a lower literacy level than their male counterparts, a reflection of the literacy levels of women vs. men in sub-Saharan Africa, as confirmed by UNESCO (2007). But interestingly, the fact that female VFTs had lower literacy levels than their male counterparts did not in any way have an effect on their competence levels on various feed technologies compared to men. Finally, not receiving financial benefits does not stop VFTs from undertaking dissemination activities. This is because they are not only motivated by financial benefits but also by social benefits as well.

This study has shown that only a minority of VFTs (23%) have been able to innovate. Innovations, in this report refer to VFTs' adaptations of the recommended practices without any external influence. Innovations according to Katanga *et al.* (2007) are practical techniques for different ways of organizing or doing things on the farm. The low number of VFTs with innovations may be attributed to the short time (18.9 months) they have served/had the technologies. Since knowledge is dynamic and it is constantly produced and reproduced, shaped and reshaped, it is expected that as VFTs continue training and implementing/experimenting with various livestock feed technologies, the number will increase. Innovations are the results of technological activity and occur because all humans have an internal quest for new and better ways of doing things. 'Better' here is used in the sense of increased durability, reliability, speed and higher productivity. Most notable innovations are mainly on propagation, the use of different combinations of feed technologies

to make silage and feed formulations and modifications on equipment/structures, such as the chaff cutter and the zero grazing unit to improve efficiency.

Finally this study has shown that although VFTs incur costs such as transport and time when undertaking their training/dissemination activities, they also, in return, receive both social and financial benefits. The four main social benefits in order of ranking include exposure, gaining confidence, increased social networks and improved social status. The financial benefits include sale of seed/cuttings and charging for services rendered. Although the social benefits are not quantifiable, they may be even be more important to VFTs than the financial benefits judging by the number of VFTs who were disseminating despite the fact that they were not getting any financial benefits from seeds and services. For example, one of the social benefits that was frequently mentioned in informal discussions with VFTs was satisfaction and for retired persons, being kept busy, thus making them look young. Can these benefits, both social and financial be able to keep VFTs motivated? The study by Lukuyu *et al.* (2012) has shown that VFTs in western Kenya have been able to continue disseminating/training other farmers even after the project ended. Social and income-generating activities were important factors that ensured sustainability of the approach in western Kenya.

6.0 CONCLUSIONS and RECOMMENDATIONS

The findings of this formal survey of VFTs, which is the first part in a series of surveys to assess the effectiveness of the volunteer farmer-trainer approach, has given a glimpse of the complementary role VFTs can play in the absence of an efficient state extension system. They are able to reach many farmers within a short period of time with minimum resources. They, however, do their work in the midst of many challenges, one of which is limited technical knowledge of some technologies. It is, therefore, important for VFTs to remain up-to-date with current knowledge; therefore, they need continuous training to improve their knowledge and skills. This demands the setting up/development of new institutional mechanisms and tools to facilitate the interaction between VFTs, farmers, researchers and extension agents. One way is to create rural resource centres (Degrande *et al.*, (2012) managed by farmer groups and their

DFBAs to complement the VFTA. A carefully developed, managed run rural resource centre will provide a powerful central point of reference where VFTs and other farmers can learn new knowledge, update their skills and even check out reference materials that they may require in their work. Such institutional mechanisms of interaction, if put in place, will provide technical support to VFTs so that they may be able to keep up with new knowledge/skills.

This study has demonstrated that VFTs are motivated not only by financial benefits but also by social benefits. However, not receiving financial benefits from the sale of seeds and charging for services does not in any way stop the farmers from undertaking dissemination activities because social benefits are just as important to them. What is critical is to keep them motivated; the two greatest motivators being gaining knowledge/skills, and altruism.

Farmer innovations are a result of farmer experimentation and adaptation. This study has documented a few innovations which need to be shared with other farmers and researchers. For sharing and validation to occur, a mechanism needs to be put in place to allow innovators to interact with other farmers, researchers, development professionals and extension agents. This can be done through exchange visits, field days and even agricultural shows. Giving an opportunity to innovators to share their innovations and even rewarding them, will build their enthusiasm, self-confidence and the motivation to innovate more. Sharing also gives innovators an opportunity to receive feedback that will enable them to improve on the innovation process. Other farmers are also encouraged to experiment. This will, in turn, build the capacities of farmers to innovate, thereby sustaining a culture of experimentation and adaptation.

Finally, VFTs have demonstrated that the mobile phone is a powerful tool in technology dissemination as it is a fast and convenient way to communicate and get prompt feedback. There was generally more use of mobile phones by female VFTs than their male counterparts, which of course saves them a lot of time which can be used to attend to household chores. The project and other development organizations need to look into the opportunities that the mobile phone presents and how it can best be utilized to boost agricultural production.

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