Lessons Learned from the Site Selection Process in Uganda

By

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December 2015

Introduction

The East Africa Dairy Development (EADD) II is a five-year project designed to help 136,000 smallholder farm families to sustainably improve livelihoods— as well as stimulate income growth for an additional 400,000 secondary beneficiaries - in Uganda, Kenya and Tanzania by 2018. The project is built on the success of EADD-I which ran between 2008 and December 2013. The vision of success for EADD II is to transform the lives of resource-poor farming families with improved market access to a wealth-creating, robust dairy value chain that benefits all industry stakeholders.

Implementing such a project requires a careful, robust and informed site selection process in order to ensure that the project objectives are achieved. A site selection protocol was developed in phase I of the project to guide the selection of suitable sites where the project would be implemented in each country. At the start of the second phase of the project (EADD II), the project team in Uganda, following the laid –down protocol, undertook a series of assessments to identify new sites for the project interventions during its life time.

The site selection process was conducted in three stages which included: scoping, prefeasibility and feasibility assessments in that order. The scoping exercise was intended to identify and map out areas with potential for milk production using secondary information, the prefeasibility exercise was to assess the potential for EADD II interventions in sites identified during the scoping exercise and the feasibility study was meant to assess the sites that emerged out of the prefeasibility study for dairy business development.

Two milk-sheds in Uganda had already been earmarked at proposal development stage, as the most probable areas since they were the only potential milk-sheds that had not been sufficiently covered in the first phase of the project (EADDI). The two milk-sheds included Southwest region covering Kiruhura, Isingiro and Ibanda districts as well as the Eastern region which consisted of Kamuli and Buyende districts.

A total of 30 sites were identified (7 in the East and 23 in Southwest) during the scoping exercise. The 30 sites were assessed using the information collected from key informants with the help of the scoping tool designed prior to the field exercise. Out of the 30 sites, 9 sites were considered not suitable and dropped from the consideration. The remaining 21sites were recommended for the next stage of assessment (i.e. prefeasibility assessment). All the 21 sites (7 in the East and 14 in Southwest) were subjected to the prefeasibility assessment. The prefeasibility assessment concluded that all the 21 sites were suitable and hence should go through the next step of site selection to assess the economic viability of each of them i.e. feasibility assessment. From the feasibility assessment, the final evaluation of the sites was conducted and 12 sites (4 in the East and 8 in Southwest) were deemed viable and hence selected as project sites for implementation. A baseline study was conducted in all the 12 sites to provide data on the project indicators against which progress would be measure during and after the project life time.

This paper seeks to assess the robustness of the site selection process. We compare the findings from the 2 datasets that were generated: one from the site selection process and the other from the baseline survey, in order to draw conclusions as to whether the assessments conducted during the site selection process would have led to the same conclusions as the more empirical baseline survey in regards to site characteristics and therefore, the suitability of the sites for project implementation. The findings of this investigation would therefore lead to a conclusion as to the strength of the site selection's assessment in guiding the selection of suitable sites for project implementation.

Objective of the study

The main objective of the study was to test whether site selection process and data led to selection of best sites suited for EADD II implementation.

Methodology:
Data

Two datasets were used in the study i.e. the site selection data which is composed of the prefeasibility and the feasibility data and then the baseline data which was collected during the survey at the beginning of the project implementation.

While the site selection data was collected from purposively selected key informants at the proposed sites during the selection exercise, the baseline data was collected from a sample of respondents randomly selected from a radius of 10km from the proposed center of the Producers Organization (PO) using geographic random points (GPS coordinates).

Baseline data was collected at household level by administering a structured questionnaire while site selection data was collected using Focus Group Discussions that the project team would hold with the key informants in a central place usually sub county offices. Some of the key informants included: District production officers, District Veterinary Officers, Cooperative leaders, Local Council leaders and private actors along the Dairy Value Chain within the respective catchment areas. These key informants made references from several documents and reports which included: Local government production department reports, Cooperative records, Livestock census reports and National Agricultural Advisory Services (NAADs) reports. During the discussions, responses would be entered into excel templates designed prior to the data collection exercise; the templates would then generate scores based on the responses captured.

In this study, the data from the baseline survey was assumed to be the gold-standard i.e. most accurate while the site selection, used as the screening test, least accurate. With the main objective of the study being to test whether site selection process and data led to selection of best sites suited for EADD implementation, the study involved identifying comparable variables from both datasets. Comparable variables were first identified and assessed in respect of their appropriateness for the study based on the study objective and their appropriateness in the implementation of EADD's hub model approach.

Data on the selected comparable variables from both data sets was summarized in forms of percentages, means and frequencies. Comparisons between these descriptive statistics from the two data sets were done in order to assess whether the two datasets differed significantly. For continuous variables, means from both datasets were estimated and deviations between means from both data sets would be computed as illustrated in equation (1).

$$\text{Deviation} = M_{ss} - M_b \quad (1)$$

Where M_{ss} is the mean from site selection and M_b is mean from the baseline for the same variable. The magnitude of the “deviation” was then compared with the standard deviation (SD) of mean estimates from the baseline since baseline data was taken be more accurate than the site selection data. If $|\text{Deviation}| > \text{Mean SD}$, then the 2 means would be considered to be significantly different, otherwise they would be taken to be within the same ranges implying site selection and baseline would have arrived at the same conclusion in regards to the variable in question.

For categorical variables, percentages and frequencies were estimated. Percentages less than 10% derived from the baseline study data would be considered too low to justify a conclusion that significant differences in results between baseline and site selection was evident. 10% was considered because the baseline sample from each site was 28 households/dairy farmers and in order for the study not to make conclusions based on chance; it was considered realistic that at least 3 households/dairy farmers to have given a particular response for the study to conclude that that particular response was not accidently given.

Table 1: Variables used in the study

No.	Variable	Description
1.	Daily milk production per cow	The amount of milk produced per cow per day
2.	Cattle breed-type	Dairy cattle kept by famers, either local, cross or exotic
3.	Herd size	Number of dairy cattle kept per farmer
4.	Primary economic activity	The activity that is considered as a major source of income for the household
5.	Grazing systems	The mode of keeping cattle i.e. whether extensive or intensive
6.	Fodder cultivation	Availability of improved cattle forages
7.	Availability of hub services	Dairy services offered by Producer organizations either from an owned facility or through outsourcing
8.	Gender	Women and Men participation in dairy activities at household level as well as decision on proceeds from milk.

Results and Discussion

This section provides the results of the analyses and discusses the implications of the results with regard to the robustness of the site selection process i.e. whether or not, the assessments conducted during the site selection process would have led to the same conclusions as the more empirical baseline survey in regards to site characteristics and therefore, the suitability of the sites for project implementation. The subsections are organized as research questions, each answering a question regarding specific variables assessed in the study.

1. Did the site selection assessment sufficiently inform the project on milk production?

The estimates of the average milk production per cow per day from both the site selection assessments (prefeasibility and feasibility) and the baseline study are presented in Table 2. From the baseline data, the averages were computed as the arithmetic mean for the daily milk production per cow as reported by farmers at the time of the survey.

On the other hand, the means from the prefeasibility study were estimates reported by key informants during the discussions held with project staff during the assessments; the same is true for the averages that were given during the feasibility study. During the discussions, the key informants were asked to give estimates of the average production per cow per day irrespective of the breed types, these estimates were given based on the production records and reports.

For ease of comparison, three deviations were computed from the estimates derived from: (i) prefeasibility and feasibility assessments, (ii) prefeasibility and baseline data, and (iii) feasibility and baseline data. Standard deviations from the baseline data were also estimated to act as standard figures against which the other deviations would be evaluated.

Table 2: Average Daily Milk Production per cow

PO Name	Prefeasibility	Feasibility	Baseline	Deviation1 (Prefeasibility & Feasibility)	Deviation2 (Prefeasibility & Baseline)	Deviation3 (Feasibility & Baseline)	Standard Deviation (Baseline)	Sample Size (Baseline)
Balawoli	4.00	5.00	3.94	-1.00	0.06	1.06	11.61	27
Buyende	1.50	1.50	0.84	0.00	0.66	0.66	1.64	28
Kagulu	1.50	5.00	0.86	**-3.50**	0.64	**4.14**	1.49	28
Namwendwa	2.25	1.50	1.82	0.75	0.43	-0.32	3.96	28
Near East	**2.31**	**3.25**	**1.87**	**-0.94**	**0.45**	**1.38**	**4.68**	**111**
Abesigana	4.00	5.00	3.47	-1.00	0.53	1.53	4.94	28
Bisheshe	6.50	5.00	4.45	1.50	2.05	0.55	6.96	28
Ishongororo	8.50	5.00	7.09	3.50	1.41	-2.09	7.29	28
Kitagwenda	4.50	5.00	3.50	-0.50	1.00	1.50	5.01	28
Masha2	5.00	5.00	3.72	0.00	1.28	1.28	3.68	27
Nyabuhikye	5.00	5.00	6.45	0.00	-1.45	-1.45	6.79	28
Nyamitsindo	4.00	5.00	2.48	-1.00	1.52	2.52	3.26	28
Sanga	3.50	5.00	5.21	-1.50	-1.71	-0.21	5.53	28
Southwest	**5.13**	**5.00**	**4.55**	**0.13**	**0.57**	**0.45**	**5.73**	**223**

From the prefeasibility results, Ishongororo has the highest average milk production per cow per day (8.5 liters) while Kagulu and Buyende have the lowest averages (1.5 liters per cow per day). The feasibility study results reveal that Buyende has the lowest average milk production per cow per day (1.5 liters) whereas from the baseline study, Kagulu and Buyende have the lowest averages; 0.86 and 0.84 liters per cow per day respectively. As observed from the prefeasibility study, Ishongororo has the highest milk production per cow per day at an average of 7.09 liters as per the baseline results. In all the 3 studies (prefeasibility, feasibility and baseline), Near East cluster as whole had lower average milk yield per cow per as compared to Southwest cluster.

Comparing the prefeasibility and the feasibility means, only one site (Kagulu) showed a deviation between the 2 datasets bigger than the standard deviation of the baseline data; for the other sites, the 2 means cannot be considered different. Comparing the prefeasibility and the baseline means, none of the means from both datasets are significantly different, since in all sites, the deviations between these 2 datasets is smaller than the baseline data standard deviations. Finally taking a look at the feasibility and baseline means, only Kagulu had its mean value significantly different between the 2 datasets

Based on the findings above, we can conclude that the baseline and the site selection results on the daily milk production per cow are not significantly different for 11 sites with the feasibility study and for all sites (12) with the prefeasibility study. In other words, site selection assessment produced reliable information regarding milk production in the sites since its results are to a large extent, comparable to the more empirically robust baseline survey results.

2. Did site selection assessment sufficiently inform on primary economic activity?

During site selection, the key informants were asked whether dairy was a key source of income for families within the site catchment areas. On the other hand, baseline survey respondents were asked to specify the primary economic activities from which they derive their livelihoods. Table 3 presents the findings on whether dairy farming was a key source of livelihood/Income in the 12 sites that were selected for the project intervention. Considering that all the households that were sampled practiced some form of dairy farming and all the sites lie within the cattle corridor, "farm management" as an economic activity at baseline was equated to "dairy farming" as per site selection. As evident in Table 2, except for one site (Kitagwenda), the feasibility study found that dairy was a key source of livelihood in all the other sites.

From the baseline results, in two sites (Ishongororo and Kitagwenda), the percentages of respondents who indicated dairy farming as a primary economic activity are lower compared to other POs (53.57% and 57.14%, respectively). This can be attributed to the dominance of big coffee plantations in Kitagwenda and maize cultivation in Ishongororo which also contribute significantly to the farmers' incomes. For the remaining POs majority of respondents (more than 60%) reported dairy farming as their primary economic activity.

Table 3: Main Source of Livelihood

PO Name	Site selection		Baseline
	Dairy is a key source of Livelihood		Respondents whose primary economic activity is farm management. (%)
	Prefeasibility	Feasibility	
Abesigana(n_b = 28)	Yes	Yes	60.71
Balawoli (n_b = 27)	Yes	Yes	66.67
Bisheshe (n_b = 28)	Yes	Yes	71.43
Buyende (n_b = 28)	Yes	Yes	67.86
Ishongororo (n_b = 28)	Yes	Yes	53.57
Kitagwenda (n_b = 28)	No	Yes	57.14
Kagulu (n_b = 28)	Yes	Yes	71.43
Masha2 (n_b = 26)	Yes	Yes	80.77
Namwendwa (n_b = 28)	Yes	Yes	82.14
Nyabuhikye (n_b = 28)	Yes	Yes	71.43
Nyamitsindo(n_b = 28)	Yes	Yes	64.29
Sanga (n_b = 28)	Yes	Yes	67.86

n_b is the baseline sample size

The results in Table 3 above show that the baseline results are in agreement with the site selection results since for the majority of the sites (11 out of 12), during the prefeasibility key informants reported dairy as a key source of income within the site catchments while for the feasibility study, in all the POs, key informants reported dairy as a key source of income for families within the catchment areas. Moreover, from the baseline study, in all POs, more than half of the respondents reported dairy farming as their primary economic activity. This therefore means that baseline would have arrived at same conclusion as the site selection assessment about the primary economic activities in the 12 sites.

3. Did site selection assessment sufficiently inform on cattle types and herd sizes?

During the site selection, the project team collected information about the major cattle types that are kept in each of the sites assessed. Similarly, the baseline survey collected data on the types of cattle that the farmers kept. Table 4 summarizes the findings from both exercises i.e. site selection assessment and baseline study.

Table 4: Dominant Cattle types kept

PO Name	Prefeasibility	Feasibility	Baseline (% of Respondents)		
			Pure	Cross	Local
Balawoli (n_b = 27)	Cross	Local	0.00	40.74	88.89
Buyende (n_b = 28)	Local	Local	0.00	14.29	96.43
Kagulu (n_b = 28)	Local	Local	0.00	17.86	96.43
Namwendwa (n_b = 28)	Local	Cross	0.00	21.43	92.86
Near East (n_b = 111)			**0.00**	**23.42**	**93.69**
Abesigana (n_b = 28)	Cross	Local	3.57	57.14	71.43
Bisheshe (n_b = 28)	Cross	Cross	7.14	85.71	42.86
Ishongororo (n_b = 28)	Cross	Cross	14.29	78.57	53.57
Kitagwenda (n_b = 28)	Cross	Cross	3.57	75.00	39.29
Masha2 (n_b = 26)	Cross	Cross	15.38	69.23	42.31
Nyabuhikye (n_b = 28)	Cross	Cross	3.57	89.29	32.14
Nyamitsindo (n_b = 28)	Cross	Cross	3.57	78.57	42.86
Sanga (n_b = 28)	Cross	Cross	10.71	96.43	42.86
Southwest (n_b = 222)			**7.66**	**78.83**	**45.95**

n_b is the baseline sample size

From all the 3 studies, the results presented in Table 4 reveal that Near East farmers predominantly keep local cattle and the baseline puts the proportion of farmers keeping local cattle in the cluster at 93.69%. In the Southwest, cross breeds dominate at 78.83% as evident

from estimates derived from the baseline data. This explains why milk production per cow per day is lower in Near East as compared to Southwest as revealed in the previous section.

As evident in Table 4, there were three cases where the prefeasibility study and feasibility differ i.e. in Balawoli, Namwendwa and Abesigana sites. However, noting that the feasibility study succeeded the prefeasibility study and was more rigorous in terms of the intensity of the assessment, we argue that the results from the feasibility would be stronger compared to the prefeasibility study but less robust compare to the baseline study which provides empirical evidence from a scientific underpinning.

Comparing the feasibility and the baseline results, it's only one site (Namwendwa) where the site selection assessment differed with the results from the baseline survey. In Namwendwa, majority of the baseline survey respondents (92.86%) reported kept local cattle, as opposed to the finding from the feasibility study that indicated crosses as the predominant breeds. Consequently, we conclude that the baseline would have arrived at the similar conclusions as the site selection assessment in terms of the dominant cattle types kept by dairy farmers with in the catchment areas of the different sites.

In addition to the dominant cattle types that farmers keep, data on the number of dairy cattle was also collected. However, in the case of site selection assessment, this data was only collected during the feasibility study. Table 5 presents the findings. From the feasibility study, the average number of dairy cattle per farmer was captured in ranges. On the other hand the baseline survey data captured the exact number of dairy cattle kept by each farmer. Table 4 presents the findings in terms of the average numbers of cattle kept per farmer.

Table 5: Average Number of Dairy cattle per farmers

PO Name	Site selection/Feasibility	Baseline		
	Average No. of dairy cattle per farmer	Mean	SD	Sample size
Balawoli	>5	3	2.14	27
Buyende	3 to5	5	8.17	28
Kagulu	3 to5	4	4.24	28
Namwendwa	3 to 5	2	1.73	28
Near East		**3.5**	**4.07**	**111**
Abesigana	3 to 5	15	20.14	28
Bisheshe	>5	12	18.96	28
Ishongororo	>5	15	24.26	28
Kitagwenda	>5	7	7.54	27
Masha 2	>5	50	191.62	26
Nyabuhikye	>5	14	13.19	28
Nyamitsindo	>5	8	8.47	28
Sanga	3 to 5	32	44.15	28
Southwest		**19.125**	**41.0413**	**221**

Results reveal that Near East farmers are predominantly smallholders with an average of less than 5 heads of cattle. Variation in the number of dairy cattle kept per farmer is higher in Southwest especially for Sanga compared to Near East.

From the results presented in Table 5 prefeasibility study results for 4 sites (Balawoli, Namwendwa, Abesigana and Sanga) seem to differ from those computed from the baseline survey. However the significance differences cannot be evaluated given that no means can be computed for the feasibility study. That notwithstanding, site selection results are comparable to the results from the baseline survey in 8 out of 12 sites where the mean number of dairy cattle per farmer in these sites is within the same range as feasibility values

4. Did site selection assessment sufficiently inform on Feeding systems and availability of Fodder?

Table 6 presents results on the major feeding systems used by farmers from both the baseline survey and site selection assessment. While the baseline survey captured data on the feeding systems used for the different cattle types (local, cross & pure) and in different seasons (dry and wet), the site selection assessments collected generalized information without specific regards to the cattle types and the different seasons.

For ease of comparisons, seasonal effects were left out as well as the different cattle types. Only the dominant cattle types per PO as presented in Table 4 have been considered in the analysis.

Table 6: Major Feeding systems

PO Name	Site selection	Only grazing (%)	Mainly grazing with Some stall feeding (%)	Mainly stall feeding With some grazing (%)	Only stall feeding (%)
Balawoli (nb = 27)	Free range	62.96	18.52	9.26	1.85
Buyende (nb = 28)	Free range	76.79	5.36	1.79	12.50
Kagulu (nb = 28)	Free range	83.93	1.79	0.00	14.29
Namwendwa(nb = 28)	Free range	57.14	17.86	0.00	14.29
Abesigana(nb = 28)	Free range	64.29	0.00	0.00	10.71
Bisheshe(nb = 28)	Free range	76.79	0.00	1.79	14.29
Ishongororo(nb = 28)	Free range	64.29	0.00	0.00	14.29
Kitagwenda(nb = 28)	Free range	41.07	5.36	3.57	23.21
Masha2(nb = 27)	Free range	50.00	0.00	0.00	14.81
Nyabuhikye(nb = 28)	Free range	55.36	1.79	0.00	28.57
Nyamitsindo(nb = 28)	Free range	60.71	1.79	0.00	19.64
Sanga(nb = 28)	Free range	75.00	0.00	0.00	19.64

n_b is the baseline sample size

From the results in table 6, based on site selection, majority of farmers in all sites, practice free rage/only grazing for their dairy cattle

Looking at the Baseline study results, it can be observed that generally, the prominent mode of feeding dairy cattle within all the selected sites is “only grazing”. Stall feeding is ranked as number 2, commonly practiced in Nyabuhikye and Kitagwenda in Southwest. In the Near East stall feeding is also second and commonly practiced in Kagulu and Namwendwa.

From the baseline results, we conclude that majority of the farmers in the selected sites use “Only grazing” to feed cattle which is consistent with the conclusion that the site selection arrived at. We therefore conclude that the site selection and the baseline are in agreement in terms of the dominant cattle rearing systems in all the 12 sites.

Improved fodder is necessary for increasing milk production especially in a short run as compared to improving cattle breeds and during site selection key informants were asked the proportions of the farmers in the respective catchment areas who grew some improved forages like nappier grass, Desmodium, Calliandra, Lucaena e.tc. Similarly, baseline survey respondents were also asked whether they cultivated the various types of improved fodder.

As shown in Table 7, site selection assessment found that 4 sites (Balawoli, Buyende, Kagulu and Abesigana) did not have considerable proportions of farmers cultivating improved fodder. However the baseline survey results revealed that fodder cultivation was practiced in all except for one site (Ishongororo) while it was limited (less than 10% farmers) in Kagulu and Sanga. The commonly grown type of fodder was Nappier ***(See appendix 1)***. Farmers cited lack of technical information (in Southwest) and unavailability of planting material especially (in Near East) as the predominant reasons why they don't grow improved fodder ***(See appendix 2)***.

Table 7: Improved Fodder cultivation

PO Name	Presence of improved fodder	
	Site selection/Feasibility	Baseline (%)
Balawoli (n_b = 27)	No	29.63
Buyende (n_b = 28)	No	10.71
Kagulu (n_b = 28)	No	3.57
Namwendwa (n_b = 28)	Yes	60.71
Abesigana (n_b = 28)	No	14.29
Bisheshe (n_b = 28)	Yes	10.71
Ishongororo (n_b = 28)	Yes	0.00
Kitagwenda (n_b = 28)	Yes	32.14
Masha2 (n_b = 26)	Yes	11.54
Nyabuhikye (n_b = 28)	Yes	21.43
Nyamitsindo (n_b = 28)	Yes	17.86
Sanga (n_b = 28)	Yes	7.14

n_b is the baseline sample size

In 3 sites (Balawoli, Buyende and Abesigana), the proportions of the farmers who reported to be growing improved fodder are relatively large, yet the site selection assessment did not report the same result. The results therefore show that baseline survey results are comparable to site

selection assessment results in only 7 out of the total 12 sites in terms of the availability of improved fodder

5. Did site selection assessment sufficiently inform on availability of hub services?

The center-piece of EADD's interventions is the hub approach where several dairy-related services (providing inputs to farmers' dairy enterprises) are centered around a milk bulking or chilling business. The services include, among others, agro-vet shops providing access to veterinary drugs and feed, artificial insemination (AI) services for breeding, animal health and advisory services, and agricultural credit. During site selection, it was important to determine which services were already in existence in the sites since this would determine the level of interventions required (hence prioritizing sites based on the ease of project) and later on, guide project interventions on how best the sites can be transformed into dairy hubs based on what is already existing and what is missing.

Table 8 presents the results from the data elicited from both site selection assessment (prefeasibility and feasibility studies) on the availability of 3 types of services (agri-input services and veterinary services in the site selection assessment which are synonymous to agro-vet and animal health services in the baseline survey data, respectively; and Artificial Insemination services (AI)). The availability of the services was assessed in terms of whether or not the Producer Organizations (POs) in the sites offer the services (either owned or outsourced by the POs).

Table 8: Access to hub Services

PO Name	Prefeasibility/Feasibility			Baseline: usage of hub services (%)		
	Agri-inputs services	Vet Services	AI	Animal Health	Agro-vet	AI
	Owns/ Outsourced	Owns/ Outsources	Owns/ Outsources	Owns/ Outsources	Owns/ Outsources	Owns/ Outsources
Balawoli (n_b = 27)	No	No	No	0.00	3.70	0.00
Buyende (n_b = 28)	No	No	No	0.00	0.00	0.00
Kagulu (n_b = 28)	No	No	No	0.00	0.00	0.00
Namwendwa (n_b = 28)	No	No	No	0.00	0.00	0.00
Abesigana (n_b = 28)	No	No	No	0.00	0.00	0.00
Bisheshe (n_b = 28)	No	No	No	0.00	0.00	0.00
Ishongororo (n_b = 28)	No	No	No	0.00	0.00	0.00
Kitagwenda (n_b = 28)	No	No	No	3.57	0.00	3.57
Masha2 (n_b = 27)	No	No	No	3.70	7.41	0.00

Nyabuhikye (n_b = 28)	No	No	No	14.29	0.00	10.71
Nyamitsindo(n_b = 28)	No	No	No	0.00	0.00	0.00
Sanga (n_b = 28)	No	No	No	0.00	0.00	0.00

n_b is the baseline sample size

From the site selection process, data show that none of the PO is providing any of the 3 services (Animal health, agro-vet and AI), either from owned facility or outsourced from a private practitioner. On the other hand, the results from the baseline survey revealed that a proportion of farmers in one site Nyabuhikye, reported to have accessed animal health and AI services through the PO in that site. However, for the other 11 sites, the proportions that reported access to the services (animal health, agro-vet and AI) through the POs in the respective sites are rather negligible.

In summary, baseline survey results concur with site selection in 11 sites for animal health and AI, and in all the 12 sites for agro-vet services.

Table 9 is a continuation of Table 8 presenting 3 more services. The table shows results for the milk transportation, extension and financial services. Financial services were broken down into monetary advance, and savings and credit services in the baseline survey.

From the results presented in Table 9, site selection assessment reported that none of the POs offered (owned or outsourced) milk transportation and financial services. On the other hand, from the baseline survey results, 3 sites (Abesigana, Ishongorolo and Masha2) had respondents who reported to have accessed milk transport and financial services through the respective site POs. However, the proportions of these respondents in the entire sample are too small (less than 10%) to justify a strong conclusion on the availability of these services in the respective sites for the general farming population.

Extension services, on the other hand, had mixed results; in some sites it was reported to exist yet very few farmers indicated having access the service, and vice versa.

The Baseline and Site selection results arrive at the same conclusion for most of the POs for milk transportation and financial services differed for the extension services for most of the POs (7 out of the 12 POs).

Table 9: Access to hub Services

PO Name	Site selection/Feasibility			Baseline			
	Milk transportation services	Financial services	Extension services	Extension services	Milk Transportation	Monetary Advance	Savings & credit services
	Own/ Outsourced	Own/ Outsourced	Own/ Outsourced	Own/ Outsourced	Own/ Outsourced	Own/ Outsourced	Own/ Outsourced
Balawoli (n_b = 27)	No	No	No	3.70	0.00	0.00	3.70
Buyende (n_b = 28)	No	No	No	0.00	3.57	0.00	0.00
Kagulu (n_b = 28)	No	No	No	0.00	0.00	0.00	0.00
Namwendwa (n_b = 28)	No	No	No	0.00	0.00	0.00	0.00
Abesigana (n_b = 28)	No	No	Yes	7.14	3.57	0.00	3.57
Bisheshe (n_b = 28)	No	No	No	10.71	3.57	0.00	0.00
Ishongororo (n_b = 28)	No	No	Yes	14.29	7.14	3.57	0.00
Kitagwenda (n_b = 28)	No	No	Yes	3.57	0.00	0.00	3.57
Masha2 (n_b = 27)	No	No	No	11.11	3.70	7.41	0.00
Nyabuhikye (n_b = 28)	No	No	No	32.14	0.00	0.00	0.00
Nyamitsindo(n_b = 28)	No	No	Yes	3.57	0.00	0.00	0.00
Sanga (n_b = 28)	No	No	No	0.00	0.00	0.00	0.00

n_b is the baseline sample size

Table 10: Overall conclusion on hub services

Indicator	No. of sites as at site selection	No. of sites where baseline & site selection concur	Proportion of the concurring sites (%)
AI	12	12	100
Animal Health	12	11	92
Agro-vet	12	12	100
Milk transport	12	12	100
Finance	12	12	100
Extension	12	5	42
Total	72	64	89

Table 10 shows that apart from the extension services, the rest of the services have site selection and baseline results in agreement. After combining all the services, baseline results ranks approximately 90% of the sites in the same range as site selection.

6. Did site selection assessment sufficiently inform on women participation in dairy activities

EADD project was designed as a gender-transformative project. One of its main objectives is to empower women through leadership and financial services that help improve their access to, and control over, productive assets and dairy income. The project intends to empower women both at the PO and household levels in terms of increasing their ability to actively participate in PO activities as well as being involved in decision making at household level. As a major project objective, site selection assessment was informed by the level of women participation in leadership and decision making in various sites. In this study however women involvement assessment has been restricted to household level and in particular production and decision making over proceeds from milk i.e. women engagement in production and marketing.

We evaluate women participation in dairy activities in terms of the average number of hours spent per female (above 15 years of age) in undertaking 4 dairy activities (herding, watering, milking and spraying/dipping) per week using baseline data. In addition to the 4 activities, we

also assess from the baseline data, the gender of the main decision makers in the dairy farm household, on how proceeds from morning milk sales is spent.

Baseline survey data consisted of the total number of hours household members and hired labors above 15 years of age, by gender (male and female) spent on the activities in the 7 days preceding the day of the survey, as a proxy estimate for weekly labor. For ease of comparison, the proportion of hours spent by women on 4 vis-à-vis those spent by men, was estimated.

Table 11: Women participation in dairy production activities

PO Name	Site selection	Baseline					
	Women participation	Average no. of hours spent by women(T_w)	SD	Average no. of hours spent by men (T_M)	SD	Women relative to men (T_w/ T_M)x100	Sample size(n)
Balawoli	Yes	5.22	8.31	13.85	12.89	37.70	27
Buyende	Yes	7.43	11.09	22.93	24.08	32.40	28
Kagulu	Yes	3.50	7.88	26.68	24.91	13.12	28
Namwendwa	Yes	5.89	10.75	15.54	20.94	37.93	28
Near East		**4.43**	**9.11**	**17.98**	**30.18**	**24.66**	**224**
Abesigana	Yes	1.79	9.45	33.18	41.88	5.38	28
Bisheshe	Yes	0.00	0.00	31.54	41.31	0.00	28
Ishongororo	No	0.57	2.64	9.07	15.70	6.30	28
Kitagwenda	No	4.82	18.66	20.43	41.72	23.60	28
Masha2	No	0.74	2.80	33.48	58.97	2.21	27
Nyabuhikye	No	1.57	8.32	30.43	64.74	5.16	28
Nyamitsindo	No	2.18	6.67	59.46	86.24	3.66	28
Sanga	Yes	3.00	15.87	69.64	79.09	4.31	28
Southwest		**1.84**	**10.08**	**35.91**	**59.90**	**5.12**	**223**

From Table 11, results from site selection assessment reveal that all sites in Near East had women actively involved in dairy production activities whereas in Southwest, it's only in Abesigana, Bisheshe and Sanga where women were reported to be actively engaged in dairy production activities.

On the other hand, baseline results in the same table show that in Near East, women spend about 25% as much time as the time spent by men on the 4 dairy activities compared to only 5% in Southwest. Near East cluster therefore has more women participating in dairy production activities as compared to Southwest.

Comparing baseline and site selection, it's clear that for all the 4 sites in Near East, results from both data sets tally since from the baseline data, the number of hours spent by women on the 4 activities in relation to those spent by men is significantly high (above 10%) as was established by site selection. In Southwest, 4 out of the 8 sites have their baseline results not depicting what was established during site selection. In Abesigana, Bisheshe and Sanga, the number of hours spent by women on the 4 dairy activities is insignificant as compared to those spent by men on the same activities yet during site selection, the participation of women was considered significant. In Kitagwenda, the time spent by women on the activities is significantly high and therefore can't be ignored as was the case during site selection.

In total, site selection results match those of baseline in 8 sites in as far women participation in herding, watering, milking and spraying/dipping is concerned.

Table 12: Decision on Proceeds from morning milk

PO Name	Site selection/ Feasibility	Baseline					
	Women participation	Head	Spouse	Joint	Other male	Other Female	Others
Balawoli (n=9)	Yes	44.4	33.3	0.0	0.0	0.0	0.0
Buyende (n=4)	Yes	100.0	0.0	0.0	0.0	0.0	0.0
Kagulu (n=4)	Yes	50.0	50.0	0.0	0.0	0.0	0.0
Namwendwa (n=4)	Yes	0.0	75.0	0.0	25	0.0	0.0
Abesigana (n=14)	Yes	78.6	14.3	0.0	7.1	0.0	14.3
Bisheshe (n=11)	Yes	81.8	18.2	0.0	9.1	0.0	9.1
Ishongororo (n=16)	No	62.5	12.5	12.5	0.0	6.3	6.3
Kitagwenda (n=14)	No	71.4	7.1	0.0	7.1	0.0	0.0
Masha2 (n=16)	No	68.8	18.8	0.0	0.0	0.0	0.0

Nyabuhikye (n=12)	No	83.3	8.3	0.0	8.3	0.0	0.0
Nyamitsindo (n=23)	No	60.9	34.8	0.0	4.3	0.0	0.0
Sanga (n=22)	Yes	86.4	9.1	0.0	4.5	0.0	0.0

n is the number of households that reported on decision on proceeds from morning milk during the baseline

After production, milk is sold to different outlets by the household; the aim of the project is to see more women engaged in decision making both at the PO and household levels. The decision making role should not however be solely left to the women but men should be engaged as well. Consequently, increasing joint decision making both at PO and household level is the desired outcome of the project. In this study, only proceeds from morning milk have been considered since limited data was captured for the evening milk during the baseline survey given that most of the farmers in the sampled sites usually sell the morning milk and leave the evening milk for home consumption. Only households where both the man and his spouse were alive and living together were extracted for analysis on this section (for the baseline data)

From the results presented in table 12, it can be observed that there is very limited joint decision within the sampled households given that its only in 1 site (Ishongororo) where joint decision making was reported though still low (12.5%). However, women are seen to be considerably participating in decision making on proceeds from morning milk since out of the 12 sites, only 4 (Buyende, Kitagwenda, Nyabuhikye and Sanga) reported limited women participation in decision making on this aspect.

Comparing site selection and baseline results, differences in the results from the 2 datasets are observed in 5 sites (Buyende, Ishongororo, Masha, Nyamitsindo and Sanga). In Buyende and Sanga, site selection revealed that there was considerable women involvement in decision making on proceeds from milk but from the baseline results, it can be observed that this is not the case since the proportions of households where women make decisions on proceeds from morning milk are small (below 10%). On the other hand in Masha, Nyamitsindo and Ishongororo, site selection revealed limited participation of women in decision making on proceeds from milk but as per the baseline results, it's observed that the proportion of households that reported women participation in decision making on proceeds from morning

milk are considerably high (above 10%) and would therefore suggest that in these sites, women have a hand in deciding on how the proceeds from morning milk are used.

Therefore baseline and sites selection results tally in 7 out of the 12 sites (58.3%) in as far as women involvement in decision making on proceeds from milk is concerned.

Over all combining the results of women engagement in dairy activities with those of decision making on proceeds from morning milk to obtain a single result for the "Gender" indicator, in majority (62.5%), site selection and baseline results were matching.

7. Overall results

Table 13: Site selection Vs baseline

Indicator	No. of Sites as at Site selection	No. of sites where Baseline & site selection tally	Proportion of the tallying sites (%)
Daily milk production per cow	12	11	92
Primary economic activity	12	12	100
Cattle types	12	11	92
Herd size	12	8	67
Grazing systems	12	12	100
Fodder cultivation	12	7	58
Hub services	12	11	92
Gender	12	8	67
Total	96	80	83

Table 13 above presents the overall picture of the comparison between the baseline results and the site selection data based on the 8 indicators that were considered for the study.

The results reveal that site selection and baseline results strongly tally for 5 indicators (Daily milk production, primary economic activity, cattle types, grazing systems and hub services). The results also fairly tallies for other three indicators (herd size, fodder cultivation and women participation/gender).

Overall, baseline results rank 83% of the sites in the same range as the site selection results. This is approximately 10 out of 12 sites. This is within an allowance of 10% error to cater for the differences in samples, mode of data collection and the times points when the 2 datasets were collected.

Conclusion

The study revealed that the baseline survey results would rank 83% of the sites- indicators the same way as the site selection process. This is an equivalent of approximately 10 sites out of the 12 sites identified during the site selection process. Considering the differences in the mode of sampling, type of respondents, data collection instruments and the structure in which questions were designed in the different data collection tools, the difference can be considered acceptable.

Out of the 8 indicators considered for the study, 5 (daily milk production, primary economic activity, cattle types, grazing systems and hub services) were accurately ranked the same way by the baseline survey as the site selection process whereas 3 (herd size, fodder cultivation and women participation/gender) were fairly ranked by the baseline results. Fodder cultivation had the lowest number of sites where baseline results concurred with the site selection results.

With the match between site selection indicators and baseline data we conclude that site selection process led to selection of best sites suited for EADD II implementation.

Appendices

Appendix 1: Commonly grown fodder

PO Name	Napier	Desmodium	Callindra	Luceana	Sesbania	Grevillia	Total
Balawoli (n_b = 27)	29.63	0.00	3.70	0.00	0.00	0.00	29.63
Buyende (n_b = 28)	10.71	0.00	0.00	0.00	0.00	0.00	10.71
Kagulu (n_b = 28)	3.57	0.00	0.00	0.00	0.00	0.00	3.57
Namwendwa (n_b = 28)	57.14	0.00	0.00	0.00	0.00	0.00	60.71
Abesigana (n_b = 28)	14.29	3.57	7.14	0.00	0.00	3.57	14.29
Bisheshe (n_b = 28)	3.57	0.00	0.00	3.57	0.00	0.00	10.71
Kitagwenda (n_b = 28)	25.00	0.00	14.29	7.14	3.57	3.57	32.14
Masha2 (n_b = 27)	11.11	0.00	0.00	0.00	0.00	0.00	11.11
Nyabuhikye (n_b = 28)	7.14	3.57	7.14	0.00	0.00	0.00	21.43
Nyamitsindo (n_b = 28)	17.86	7.14	3.57	0.00	0.00	0.00	17.86
Sanga (n_b = 28)	0.00	3.57	3.57	0.00	0.00	0.00	7.14

Appendix 2: Reasons for failure to practice fodder cultivation

PO Name	Lack of technical Information	Unavailability of planting material	High cost of planting material	Not enough land	Lack of Labor	Not aware of benefits	Have had no interest	Total
Balawoli	4(25.00%)	7(43.75%)	1(6.25%)	6(37.50%)	2(12.50%)	2(12.50%)	3(18.75%)	16(100%)
Buyende	9(42.86%)	15(71.43%)	5(23.81%)	5(23.81%)	2(9.52%)	3(14.29%)	0(0.00%)	21(100%)
Kagulu	13(54.17%)	10(41.67%)	12(50.00%)	5(20.83%)	0(0.00%)	4(16.67%)	0(0.00%)	24(100%)
Namwendwa	1(14.29%)	4(57.14%)	1(14.29%)	2(28.57%)	0(0.00%)	0(0.00%)	2(28.57%)	7(100%)
Abesigana	13(72.22%)	6(33.33%)	2(11.11%)	1(5.56%)	0(0.00%)	2(11.11%)	2(11.11%)	18(100%)
Bisheshe	8(44.44%)	10(55.56%)	1(5.56%)	6(33.33%)	2(11.11%)	1(5.56%)	2(11.11%)	18(100%)
Ishongororo	9(42.86%)	5(23.81%)	2(9.54%)	2(9.52%)	0(0.00%)	1(4.76%)	9(42.86%)	21(100%)
Kitagwenda	8(47.06%)	4(23.53%)	1(5.88%)	4(23.53%)	1(5.88%)	1(5.88%)	8(47.06%)	17(100%)
Masha2	10(58.82%)	6(35.29%)	4(23.53%)	2(11.76%)	1(5.88%)	1(5.88%)	4(23.53%)	17(100%)
Nyabuhikye	10(62.5%)	2(12.50%)	2(12.50%)	0(0.00%)	1(6.25%)	2(12.50%)	6(37.50%)	16(100%)
Nyamitsindo	11(61.11%)	4(22.22%)	3(16.67%)	6(33.33%)	1(5.56%)	4(22.22%)	2(11.11%)	18(100%)
Sanga	13(72.22%)	8(44.44%)	1(5.56%)	3(16.67%)	195.56%)	4(22.22%)	3(16.67%)	18(100%)

Detailed description of the study variables

- Daily Milk production per cow

Defined as the amount of milk produced per cow per day otherwise referred to as cow productivity; the overall objective of the East Africa Dairy Development Project 2 (EADD2) is to increase incomes of small holder dairy farmers within the sites where interventions are directed by increasing milk production per cow and consequently milk production per household. It was therefore prudent to have this variable included for the study to check whether what was collected during site selection actually tallies with the results from the baseline.

- Primary economic activity

EADD2 is a dairy development project and therefore aims to work within communities where dairy farming is a key source of livelihood/income to the dwellers. By exploring the primary economic activities within the selected sites and comparing with the responses from site selection, it would give a glimpse of whether the project is working with the right communities.

- Cattle types

One of the project's targeted key outcomes is improving milk production in dairy farm households. Milk production per cow is a function of many aspects part of which is the cattle breeds and types. Among other productivity enhancing technologies, the project aims at improving milk production through breeding in order to produce superior cattle genotypes with higher productive potential. It was therefore important to identify which cattle types are kept in which sites to inform project interventions and priorities in terms of cattle breed improvement.

- Herd size

The project intends to work with smallholder dairy farmers. Ideally, the project recognizes smallholder dairy farmer as those who keep 1to 5 heads of cattle. It was therefore important for the project to identify potential sites with higher proportions of smallholder dairy farmers, who are the project's main target group. Moreover, information on herd sizes in different project sites would be important in guiding project interventions, for instance, the formulation of nutrition, animal health and breeding plans.

- Grazing systems

Grazing systems implicitly depict the predominant farming system in an area i.e. whether extensive or intensive, and as such the types of farmers in the area i.e. smallholder intensive or large extensive farmers. This information was important in site selection for

potential EADD sites in order to identify the target farmers and consequently the farming system they use. Moreover, grazing systems determine the types interventions/technologies to promote. What may suitably apply in the extensive system might not apply in the intensive system. It was therefore important to identify the dominant grazing system in the sites to guide project interventions.

- Fodder cultivation

Fodder availability is one of the components that can help the project improve milk production both in the short and in the long run unlike breed improvement which is a long-term intervention. Assessing the availability of these feeds in the different sites was therefore key in identifying which sites already had the greater potential in terms of the existence of the necessary structures for improving milk production. These would guide in prioritizing the sites for project interventions.

- Availability of hub services

The center-piece of EADD's interventions is the hub model approach where several dairy-related services (providing inputs to farmers' dairy enterprises) are centered around a milk bulking or chilling business. The hub approach is meant to provide farmers with access to inputs as well as market for their milk. The services include, among others, agro-vet shops providing access to veterinary drugs and feed, artificial insemination (AI) services for breeding, animal health and advisory services, and agricultural credit. During site selection, it was important to determine which services were already in existent in the sites since this would determine the level of interventions required (hence prioritizing sites based on the ease of project) and later on, guide project interventions on how best the sites can be transformed into dairy hubs based on what is already existing and what is missing.

- Gender

EADD project was designed as a gender-transformative project. One of its main objectives is to empower women through leadership and financial services that help improve their access to and control over productive assets. The project intends to empower women

both at the PO and household level in terms of increasing their ability to actively participate in PO activities as well as being involved in decision making. As a major project objective, site selection assessment had to be informed by the level of women participation in leadership and decision making in various sites. In this study however women involvement assessment has been restricted to production and decision making over proceeds from milk.