Endline report Evaluation of the Dutch Food Security Programme in Uganda - including an impact study of the aBi-Trust Dairy project

Country case study for the food security policy evaluation for the Dutch Ministry of Foreign Affairs



Final Report



Endline report

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Foreword

This report is the final report on the evaluation of the Dutch Food Security country programme for Uganda 2012-2015 and the impact evaluation of the aBi-Trust Dairy project. This evaluation was commissioned by the Policy and Operations Evaluation Department (IOB) of the Ministry of Foreign Affairs of the Netherlands.

The views and opinions are those of the authors, not necessarily those of the Ministry of Foreign Affairs or IOB.

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Executive summary

Purpose and scope

This report presents the findings of the impact evaluation on the Dutch food security programme in Uganda in the period 2012-2015. This impact evaluation is part of a broader policy evaluation by Policy and Operations Evaluation Department (IOB) of the Ministry of Foreign Affairs (MFA) of the Government of the Netherlands. The countries included in this evaluation are: Bangladesh, Ethiopia, Rwanda and Uganda. The consortium of Stichting Amsterdam Institute of International Development (AIID) and PricewaterhouseCoopers Advisory N.V. (PwC) has been commissioned to review the food security programmes in Rwanda and Uganda.

The evaluation of the Food Security Programme Uganda 2012-2015 started in 2013. An inception visit was conducted in November 2013 and the inception meeting by IOB (2013) with all evaluators working on Food Security country evaluations in Bangladesh, Ethiopia, Rwanda and Uganda provided further guidelines for the evaluation. The **inception report** for the evaluation in Uganda was delivered to IOB in February 2014.

Second, the **baseline report** was prepared in 2015. The baseline report included all findings of the conducted desk research on project-level documentation. This included a field visit in April 2014.

Lastly, the **end line evaluation** has been carried out in 2016 and its findings and results are presented in this report. The evaluation period focuses on the years 2012 until 2015. During the end line phase three evaluations were completed:

- A. The portfolio evaluation of all nine projects (excluding aBi-Trust) for a standard assessment. This assessment is based on desk research and interviews during the endline visit. The table below lists all projects. All projects that were evaluated using the standard assessment are labelled 'A'.
- B. The in-depth qualitative evaluation of three projects (labelled 'B').
- C. The in-depth quantitative and qualitative evaluation of the aBi-Trust project (23615), labelled 'C'.

| Project number | Project name | Eva | luatio | n type |
|-------------------|--|-----|--------|--------|
| 23473 | Operationalisation DSIP | Α | | |
| 23614 | KAM Support Fund Food Security | Α | | |
| 23615 | Support to aBi-Trust for Dairy | | | С |
| 23616 | KAM-CATALIST UGANDA | Α | | |
| 23617 | KAM integrated Seed Sector Development in Uganda (ISSD-Uganda) | Α | | |
| 23618 | KAM-Agri-skills 4 you | Α | В | |
| 23619 | KAM support to TradeMark East Africa - Uganda program (Intraregional Trade) | А | В | |
| 23620 | PASIC - Policy Action for Sustainable Intensification of Cropping Systems (Agri Policy Action) | A | | |
| 25882 | KAM Financial Inclusion | Α | B | |

Table 1 - Overview evaluation type of projects

Evaluation questions and methodology

The following evaluation questions (as based on the ToR by IOB (2013)) have been answered in this programme evaluation:

- 1. What is the composition and motivation for the Dutch Food Security Country Programme 2012 –2015 in Uganda?
- 2. Which instruments are being used and what is the synergy in tackling food insecurity?
- 3. How does the expenditure relate to the number of directly and indirectly targeted beneficiaries, and to the expected food security effect per beneficiary?
- 4. What are the effects of a) the Dutch country programme, and b) the selected project, on food security?
- 5. What can be said about the efficiency or cost-effectiveness of the food security interventions?

Methodology for portfolio review and qualitative studies (A & B)

Based on an initial analysis of project documents, during the end line field visit (24-30 July 2016) interviews were held with the representatives of the project implementers for the eight projects for evaluation A. For evaluation B project-sites were visited, interviews were conducted with project staff, local representatives and beneficiaries. For the project of Financial inclusion this was done through individual interviews. For the other two B-projects a total of three focus group discussions (FGDs) were held during the final field visit. The FGDs were aimed at gaining insight in the perspective of project beneficiaries and the impact of the projects on their situation.¹

Methodology for the case study of aBi-Trust (C)

The aBi-Trust Dairy project was selected by IOB for an in-depth quantitative project level evaluation. Support to aBi-Trust for Dairy is a project that intends to strengthen market access of the dairy value chain and the different actors in the target geographical area, the South Western Milk Shed. The main evaluation topics are:

- the milk prices received by cooperatives and their bargaining position;
- volumes of milk bought and sold and business transactions with and without the use of cooler;
- quantities of milk sold by farmers to the cooperatives and prices received.

This study utilizes a quasi-experimental design to evaluate the impact of the aBi-Trust project, particularly regarding the project interventions on dairy cooperative empowerment and households' food security and welfare. The study includes 48 cooperatives and 840 farmers in the baseline (in 2014) and 700 farmers in the end line (in 2016).

Results and conclusions

The results and conclusions are presented for the five overall evaluation questions², the sustainability of the food security programme and the unplanned positive and negative effects. The findings and conclusions of the case study are included were relevant and also presented separately.

EQ1: Composition and motivation of Dutch food security programme

Food security was a new programme for EKN Kampala. Although EKN had its strategy ready in 2012, it used 2013 as a start-up year and the complete intervention logic was first described in 2014. The objective is clearly described in the Multi Annual Strategic Plan (MASP) 2014-2017 and aligns with that of the Government of Uganda to move the country from an economy centred on small-scale agriculture towards a more industrialized middle-income country, being led by the private sector. Most projects have a clear food security objective. In the MASP 2014-2017 the focus on economic cooperation was made explicit in the EKN programme and the synergy between food security and economic cooperation was captured in the intervention logic presented in the MASP. The added focus on economic cooperation seems to have come at the cost the food security focus. For several projects the implementers did not define clear food security objectives at the start of the project. In our view, this would have been advisable since it would have allowed for better monitoring of food security results and for continuously steering the projects towards these objectives during their implementation.

The strategy of EKN is mostly in line with the country's food security situation. The decentral programme of EKN focuses on youth inclusion, value chains, and productivity, which are important concerns in Ugandan society were youths are disillusioned with agriculture, market integration is limited and rapid population increase demands domestic production of large food quantities. The Northern region is the poorest and most food insecure of Uganda. Although the North-eastern region, which is by far worst off in terms of food security, is not targeted by the Dutch food security programme, the rest of the North, the East (second worst in terms of food security) and the Southwest are targeted. Population growth is another concern for Uganda. This theme is only sparsely covered in the project portfolio, through training on SRHR. However, indirectly EKN's focus on access to food and increased food production is another approach towards overcoming the anticipated growth of the availability gap.

¹ The FGDs were prepared and conducted by evaluators from the Netherlands with colleagues from Uganda. The detailed approach to the FGDs is provided in Annex G.

² Question 5 on cost-effectiveness is answered in relation to question 3 and 4 to improve readability.

The focus of the Dutch Foreign policy and EKN's shows a strong link with the targets of the Government of Uganda. Furthermore, the government of Uganda holds the opinion that development of the agricultural sector should be private-led. EKN shares this opinion and has directed its efforts towards stimulating the Ugandan private sector. This shows in the many projects that are aimed at commercialising farmers and farmer groups and connecting them to markets. Furthermore, attention is paid to trade conditions via the intra-regional trade project which supports the focus on foreign investment in the strategy of GoU. Finally, an important difference is that nutrition and food intake at the level of the individual food insecure citizen are prominent in the GoU strategy but are not included in the focus of EKN. The same goes for the importance of job creation in itself, which is a core goal for GoU but is less at the forefront of the EKN programme.

EQ2: Instruments and synergies in Dutch food security programme

The primary instrument of the programme are the grants to implementing organisations. The programme consists of a diverse selection of channels, including multilateral cooperation, international NGOs, knowledge institutes and private sector. Private sector development (PSD) is a central approach for most channels. Activities aimed at PSD include institution building, construction works, value chain integration, and capacity building of farmers. Four of the nine projects are funded and implemented together with other development partners.

The synergies within the programme are essential for EKN, and EKN's perception is that the most successful projects are those that link Value chain development to institutional change and activities addressing restrictions to commercialization. This logic is integrated in the portfolio, which contains a mix of projects targeting each of these conditions (farm level, institutional, commercial environment). Making the categorisation of these projects explicit in this evaluation has made the (potential for) 'farmers-level – enabling environment' synergies clearer.

The second form of synergy in the programme exists between economic cooperation and food security, both of which EKN integrated in a single intervention logic. At least two of the projects make more sense from the economic cooperation viewpoint (i.e. Financial inclusion and Intra regional trade), since only a small part of these projects is dedicated to food security. Based on synergies with projects targeting food security, the inclusion of these projects becomes clear. The projects focused primarily on food security have been stimulated by EKN to target economic cooperation where possible, making the trainings of farmers more relevant to the markets (e.g. in CATALIST and ISSD).

EKN has taken the initiative to stimulate portfolio project implementers to connect in order to form synergies. This has led to some cooperation between the projects. Access to finance was provided to some farmers in farmer skill programmes and activities aimed at legislation changes on seed production supported a project training seed farmers. While most outcomes were results from individual projects, these cooperation between the projects have made some tangible differences. At the same time, there are still possibilities for synergies not utilized and could be more mutually reinforcing.

EQ3: Costs per beneficiary and cost per output

In determining the costs and the benefits for the programme in terms of number of beneficiaries and costs per project over the evaluation period we came across several difficulties.

- 1. First, the definition of beneficiaries between EKN and IOB differed. In a strict sense IOB refers to the food insecure as beneficiaries. EKN defined small-holder farmers as the key target group. In line with the definitions used by EKN as well as IOB, we have taken the project beneficiaries to be those (rural) people targeted by the projects.
- 2. We have decided to focus the cost-benefit analysis on projects with direct beneficiaries only.
- 3. At the time of the endline data collection (July 2016) most of the projects were still ongoing, albeit in the final stages. The total amount spent by EKN was thus not final.
- 4. Related to the previous point, for several projects the total number of beneficiaries was not final and one of the projects (Financial inclusion) was only half way along in its implementation.
- 5. Fifthly, information on the number of direct and indirect beneficiaries was not always available, especially because no final reports were available at the time of the endline.

6. Lastly, EKN was not the only donor and the benefits from the funding could not be attributed to EKN funding alone. We have therefore chosen to use the total project costs and total numbers of beneficiaries reached.

Given these restrictions we come to the following overall findings. Over the programme as a whole at least 200,000 direct beneficiaries have been reached and the costs per beneficiary are roughly \in 600. The project with the lowest number of direct beneficiaries was KAM Support Fund (around 4,000). The project with the highest number of beneficiaries reached was CATALIST Uganda with over 70,000 direct beneficiaries. The costs per beneficiary is lowest for ISSD, namely \in 106. Based on these estimates, ISSD can be considered most successful in providing cost-effective support to end-beneficiaries, many of whom are expected to be food insecure.

EQ4: Effects of the programme on food security

Among the projects in the programme, 6 out of 9 projects targeted food security. For some projects we received examples of effects on beneficiaries but structural data was often not collected. If the projects would have reported on this information, it would have made a more accurate assessment possible. Outputs monitored by projects do cover several of the (proxy) output indicators (including income and production) set by IOB and the MASP. The findings on the effectiveness per project have been synthesized in the following table:

| Project | FS objective | Benefi- ciaries | Food Availability | Food access | Food stability | Food Utilisation | PSD |
|----------------------------|-----------------|--------------------|----------------------|----------------|-------------------|---------------------|-------------|
| CATALIST | Explicit | 70,000 | Highly | Likely | Likely | - | Several |
| ISSD | Explicit | 55,000 | Highly | Likely | No evidence | Likely | Likely |
| Agri-Skills | Explicit | 12,250 | Likely | Likely | Likely | - | Likely |
| aBi-Trust | Explicit | 10,000 | Limited | Some | Some | Likely | Likely |
| Intraregional Trade | Implicit | 20,000 | No evidence | Some | No evidence | - | Highly |
| Financial inclusion | Implicit | 36,000 | - | No evidence | No evidence | Not directly | Several |
| KAM Support | Indirect | 4,000 | No evidence | Several | Likely | Some | Several |
| Operationalization DSIP | Indirect | N.A. | No evidence | Low | Likely | No evidence | Very low |
| PASIC | Indirect | N.A. | Very low | Some | Low | Low | Very low |

 Table 2 - Overview of the effectiveness of the projects

Aggregated to the programme level, we conclude that the portfolio of projects has mainly benefited household food access. On an institutional level results are rather limited. On the individual level of food consumption it has not been possible to determine the realized change. It is likely that amongst the beneficiaries are many people who are in some way food insecure. The infrastructure developments have benefited all users and the programme focused on areas were food security is highest. A more structured and integrated effort to realize institutional improvements to food security could contribute to more fundamental transformations.

Direct beneficiaries: Value chain projects

Overall the value chain projects (particularly CATALIST and ISSD) at the farmers-level have contributed to better food availability and access to food by improving productivity and incomes for farmers, while for some projects, including aBi-Trust this was found not to be the case. Also, the degree to which they have contributed to food stability and food utilization is less evident. Private sector development was central to these projects but has only partly been accomplished. Especially Agri-skills and CATALIST encountered difficulties in integrating the project in existing value chains. Improved performance of selected agro-food value chains and actors was realised for different agro-food value chains. This primarily includes the farmers that perform better and are more connected to markets. aBi-Trust has been able to establish a cold-chain for milk, increasing the cooler capacity manifold and making it financially viable for cooperatives. Value chains have been strengthened and the link from farmers to the private sector, to processors and bulk buyers has been established.

Due to the projects, farming practice in the respective value chains has significantly changed and new value chains actors have been created where these were missing (e.g. seed producers by ISSD). Especially at this level it is very likely that food insecure people have been reached, due to the locations and because of the relatively

high degree of women and youth included. Unfortunately this was not structurally measured, so supporting evidence is limited to reported narratives and data from the Focus Group participants.

Direct beneficiaries: enabling environment

For the market enabling projects Intra regional trade and Financial inclusion have made a large contribution to private sector development. Their contribution to the food security aspects is less evident. This was also not the primary objective of the projects. Intra-regional trade has contributed to better physical access to food due to better import and export opportunities which are used by large companies and small food traders. There is no evidence that the projects have contributed to food stability although for Intra regional trade this is more likely. Financial Inclusion has been successful in providing more opportunities for entrepreneurial women (hence better score on PSD).

Indirect beneficiaries

With regard to the policy enabling environment, the programme has made modest contributions in strengthening other stakeholders, making institutional contributions that affect the agricultural sector, and removing restrictions and bottlenecks to the agro-value chains. The work to influence policies and frameworks was not as impactful as anticipated, and the most concrete result, approval of legislation, is in an advanced stage but also currently still pending. Several by-laws have been passed (by PASIC and Intra-regional trade) but their effectiveness will depend on enforcement. Especially the mobilization of stakeholders in platforms and meetings and the cooperation and strengthening of relevant government institutions such as ZARDI's (local extension offices) by ISSD has been impactful.

Sustainability of the programme

The analysis of the degree to which the projects can be considered sustainable is synthesized in the following table. For each project only the most relevant sustainability aspects have been reported. The sustainability has been classified on a scale from very low to very high, very low meaning that it is highly unlikely that impact will have a lasting effect beyond the project (or extended project if no considerable changes are made) and very high meaning that it highly likely that lasting change has been realized. The table only shows a score on the types of sustainability that are applicable to the specific project.

| Sustainability | Institutional | Financial | Environmental | Economic (social) |
|--------------------------------|---------------|-----------|---------------|-------------------|
| CATALIST | - | Low | Sufficient | Some |
| ISSD | High | - | Sufficient | Some |
| Agri-Skills | Low | - | Some | Some |
| aBi-Trust | - | - | - | Some |
| Intraregional Trade | Sufficient | Low | - | High |
| Financial inclusion | - | Low | - | Unknown |
| KAM Support | Some | - | - | Some |
| Operationalization DSIP | Low | Low | - | - |
| PASIC | Low | Low | - | - |

Table 3 - Level of sustainability for portfolio projects

The sustainability of all projects has been assessed. ISSD scores high and contributes to lasting changes to the sector. Other projects such as PASIC and Financial inclusion score low on sustainability. It is highly uncertain if Financial inclusion will continue the food security activities after the project has ended while for PASIC the lobby activities and capacity building of MAAIF are not institutionalized. With regard to environmental sustainability CATALIST and ISSD are at least partly contributing to this. Overall the programme will likely have lasting effects on the food security situation.

Unplanned, positive or negative, effects of the programme

The projects that have been studied in-depth did not always follow the exact intended pathway.

The unintended negative effects form risks for food security that should be seriously considered. Some could be addressed, including the high interest rates in the case of the Financial Inclusion program. In this project there is an occurrence of debts as farmers could not repay their loans. This was caused by disappointing harvests as a

result of climatic variances (droughts as well as too much rainfall). This was noted by Financial Inclusion as well as CATALIST about the 'safe for loan' product. This is a risk which can have the opposite effect on farmers, declining their households' food security. Also, aBi-Trust shows that prices paid by cooperatives to farmers might not always increase, even if production improves, which could have to do with increased costs for using the introduced technologies and materials.

For Intra-regional trade the most important unintended negative effect reported during the focus group discussions is a stagnation of income for small farmers and traders due to the influx of cheap imports of cash crops. Apart from the experienced benefits of exporting, the traders also noted that they generally feel like they benefit from import. However, on the other hand several traders viewed the increasing openness of trade-borders as an issue. This also means that farmers are more vulnerable to international price fluctuations.

From a food security perspective these effects are not favourable and could even reduce food security.

Findings of the impact evaluation of the aBi-Trust Dairy Project

This report presents findings of the in-depth evaluation of aBi-Trust implemented in the target geographical area: South-Western Milk Shed in Uganda. The Programme targeted critical bottlenecks along the dairy value chain that are impeding sustainable and profitable access to markets, such as lack of cooling equipment and milk quality control. The interventions were mainly focused on raising farm incomes through improved technology and access to markets. The access to markets was limited because the cooperatives could not afford milk cooling equipment themselves, which led them to lease the equipment from a milk processor called Sameer. This obliged the cooperatives to sell their milk to Sameer at predefined prices.

Intervention

The primary beneficiaries of the programme are dairy cooperatives and unions in the South Western Milk Shed. The farmers in the target area form 90 primary dairy cooperatives, which in turn are organized in nine district unions (secondary cooperatives). The unions are members of the Uganda Crane Creameries Cooperative Union (UCCCU)³. This tertiary cooperative executed the programme, financially monitored by aBi-Trust.

The interventions include the provision of: (i) Equipment for milk cooling and handling equipment for dairy primary cooperatives; (ii) Insulated bulk tankers for milk transportation; (iii) Refrigerated trucks for milk and other dairy products delivery for partnering processors. In addition, the intervention was delivered through training in the following aspects: (i) Clean Milk Production and Handling; (ii) Lactoscan Cooler, Generator Maintenance and Hygiene; (iii) Milk hygiene, (iv) Ownership and Governance of Farmer Dairy Cooperative Societies; (v) Livestock Feeding and Pasture Establishment & Management; (vi) Dairy Business Management and Quality Control.

Overall, the expected outcomes of the interventions were:

- Improved access to markets for the dairy farmers: Dairy households directly benefit through the strengthened dairy cooperatives that are linked to the Uganda Crane Creameries Cooperative Union (UCCCU), as the programme coolers allow the cooperatives to sell their milk to other clients than Sameer;
- Increased quantity of milk marketed: 72 million litres of milk marketed through Milk Collection Centres (MCC) per year by 2015;
- Increased household income: UGX 50.4 billion (about Euro 16m) per year realized from milk sales by MCCs by 2015.

As a considerable proportion of the budget (26.8 percent) was used for providing milk cooling and handling equipment, this evaluation focuses on the cooler equipment in combination with the training. The equipment delivered to dairy cooperative societies was provided on a matching basis with 50% subsidized payment modality; where the primary dairy cooperative society met half of the cost and the rest was a grant through the intervention. Note that, in order to pay for these costs, the cooperatives generally got a loan through Pride

³ http://www.ucccu.or.ug

Micro-finance – a financial institution operation in the region and country at large. They deduct the loan repayment from the price of milk paid to the farmers, usually about 50 UgX per litre of milk.

The programme targeted part of the dairy farmers that are member of the cooperatives for the training. It was envisaged that the individuals trained would pass-on the knowledge and skills acquired to other members of a dairy cooperative society. The trainings were mostly focused on improving milk quality, rather than increasing milk production. A productivity push requires longer-term investments. However, productivity is included in this study to check for unexpected effects.

Evaluation strategy

The interventions were expected to affect outcomes at the cooperative level and at the farmer level. The main outcomes of interest at these levels are: volumes and prices of milk bought and sold for cooperatives and volumes and prices of milk sold, income and food security for farmers.

The evaluation adopted a quasi-experimental design to investigate the impact of interventions for dairy value chain development. In particular, the evaluation design aimed to compare differences in outcomes before and after the interventions between, on the one hand, beneficiary cooperatives and farmers and control cooperatives/farmers on the other. Hence, this so-called differences-in-differences analysis compares the trends over time between farmers who live in the area where the intervention is implemented (the treatment group from the south-western region) and farmers from a comparable area where the intervention was not implemented (the control group from the central region). To implement this design, the following data collection took place. In April 2014 baseline survey data was collected and in July 2016 endline survey data was collected among the same respondents using (near) identical survey instruments.

It is important to note that 7 out of the 43 treatment cooperatives from the south-western region did not receive any programme coolers between March 2014 and July 2015. Because of this, two treatment definitions were used throughout the analysis to compose a treatment and a control group: UCCCU treatment status and 'additional cooler' treatment status. The UCCCU treatment group comprises all samples cooperatives and farmers from the south-western region, as discussed before. The 'UCCCU treatment analysis' provides an estimate of expected "gross" impact, taking into account the fact that some assigned treatment may not in reality take place as planned. Because seven out of the 43 UCCCU treatment cooperatives did not receive a cooler, the analysis of the UCCCU treatment definition might underestimate the treatment effect.

For the analysis at the cooperative level, due to the small cooperative control group and missing values in the data, a differences-in-differences analysis based on cooperative-year means was not feasible. Hence, we exploit time series data, which contains monthly data on prices and volumes of milk bought and sold for the 12 months before the surveys in 2014 and 2016.

Results

Below, we first describe the findings at the cooperative level, and subsequently the results at the farmer level.

Cooperative analysis

In the cooperative analysis we compare months with and without the programme coolers, researching the volumes of milk bought and sold and the corresponding prices. The programme logic assumes that farmers can sell their evening milk to the cooperatives after the acquisition of the coolers by the cooperatives, as they can save the milk until the next day. The effect of the coolers on aggregate volumes bought and sold and collection of evening milk is not significant, but we do find quite substantial diversion of trade towards "other processors". During the study period, a new milk-processing factory called Pearl was build. This is likely to be due to that processor.

Moreover, the data confirm that the cooperatives deduct the loan repayment for the coolers from the price of milk paid to the farmers. The results show a decrease in the price of about 50 UgX per litre. Interestingly, this was not found in the farmer data.

We do not find an effect on the price of milk sold⁴. Before the intervention, cooperatives rented coolers from Sameer, to which the cooperatives had to sell their milk at a low price. The intervention was expected to erase this dependency, and to give the cooperatives more bargaining power towards Sameer. However, the results show a significant decrease of 103 UgX in the price per litre paid by Sameer after installation of the programme coolers. This suggests that the coolers did not increase the bargaining power of the cooperatives within two years.

Combining these results, the effect on revenue from milk sales is even significantly negative. However, note that the data contains many missing values in both the price and volume data, which are multiplied and summed up for calculating the revenue from milk sales. For months with missing volume and price data for certain clients, we assume that there were no sales to those clients. If this assumption is wrong and milk was sold in those months to those clients, the effect might be underestimated.

As empowering the dairy cooperatives is at the core of the intervention, the lack of evidence for a positive effect on the cooperative business transactions suggests that the findings at the farmer level will be limited as well.

Farmer exposure to the intervention

By providing equipment and training, the intervention was expected to make membership in the cooperatives more attractive for the farmers. The finding of an increase of 17.3 percent in the number of households with a registered member at a dairy cooperative society confirms this. At end line, 84.5 percent of the treatment farmers were registered members compared to 55.2 percent of control farmers.

Between baseline and endline, 44 percent of the treatment farmers confirmed participation in trainings in dairy production, while 24 percent of control farmers participated. Even though the treatment group received more training than the control group, the fraction of treatment farmers that received training did not increase during the study period based on the difference-in-difference results. Note that the programme did not aim to train all the farmers, but instead aimed for training a group and assumed that these farmers would pass on their knowledge and skills to other farmers.

Looking at dairy production techniques, we only find a significant increase in the fraction of farmers who have knowledge about vaccination skills and we do not find any effect on the self-reported adoption of the techniques. However, using the 'additional cooler' treatment definition, we find significant adoption of techniques in animal health management, animal breeding, animal nutrition and vaccination, suggesting that the UCCCU treatment definition underestimates these effects. According to the qualitative findings, the farmers appreciate the hands-on, practical style of the trainings.

The self-reported indicators show significant adoption of specific techniques. However, the indicators about the use of the specific materials do not reflect the self-reported findings. The programme promotes milk cans over plastic jerry cans for storage and transportation because they are easier to clean and cool milk faster. Yet, the use of milk cans was already high at baseline in the treatment area. At baseline, 84.6 percent of treatment farmers used milk cans compared to 28.9 percent of control farmers. In addition, while the milk shed is preferred as it covers the fresh milk, only 9.3 percent of treatment farmers milk their cows in a milk shed at end line. Note that building a milk shed required an investment that most farmers could not afford. The results on herd size and structure were also limited. Finally, there is a significant decrease in fenced grazing without paddocks and an insignificant increase in fenced grazing with paddocks, which could be seen as an improvement.

Expenditures on dairy production

The analysis does not find an effect on the amount of expenditures on dairy production equipment. From the treatment uptake described above it follows that an increase in expenditures on production equipment is also not expected.

⁴ Also in the farmer level findings we do not find any significant results on prices, even though the coefficient of the price paid by cooperatives is positive.

Milk production, utilization and prices

The intervention logic states that the coolers enable cooperatives to buy more milk from the farmers, but as mentioned before, increasing milk production requires longer-term investments. Hence, the expected result is an increase in the share of milk sold to cooperatives, rather than the milk production.

The data confirm that there is no impact on milk production. Even though the coefficient of the volume of milk sold to cooperatives is positive, the effect is not significant. Using the 'additional cooler' treatment definition, we also find an increase in the share of milk used for own consumption of 5.7 percent.

Another assumption in the intervention logic is that the farmers can sell their evening milk to the cooperatives, as they can store the milk in the coolers. Yet, the results cannot confirm this hypothesis. The qualitative findings reveal that few farmers have animals that produce large quantities of milk in both the morning and the afternoon. Moreover, the small quantity of milk produced in the afternoon is often used for own consumption or for the calves.

Wealth and food security

With no effects found on volumes of milk sold and prices, we also do not find any impact on dairy income nor on wealth.

Interestingly, there are positive and significant results for food security. The effect on the number of meals eaten yesterday by both adults and children is significant when using the UCCCU treatment definition, but not when using the 'additional cooler' treatment definition. However, using the latter, there is slightly significant positive effect on the Food Consumption Score of 14 points.

The results cannot confirm the programme logic. The limited findings in the previous steps of the result chain make attribution of the positive effects on food security to the intervention unlikely. The non-significant findings on volumes and prices of milk sold are consistent with the findings at the cooperative level.

Conclusion

Besides the decrease in the price paid by the cooperatives to the farmers due to the loan repayment, the intervention had no impact on volumes or prices of milk sold by either the cooperatives or the farmers. While the farmers indicated that they adopted the techniques that were taught during the trainings, the results did not show changes in the use of the promoted production systems, equipment and techniques. Hence, the intervention was successful in creating awareness among the farmers about techniques to improve their milk quality, but it did not have impact on the farmers further in the result chain.

The study had some limitations. One limitation of this evaluation is the study period of two years. Some cooperatives received their coolers in July 2015, one year before the end line survey. It might take longer for the cooperatives to improve their ownership and governance, in order to establish the bargaining power they need when negotiating prices. Only when the cooperatives become more profitable and divide the profits among the farmers, the programme maximizes the benefits for the farmers.

It is possible that the intervention only addressed a certain set of constraints, while other constraints are still present. For example, the programme promotes farming techniques and equipment that require an investment from the farmers. Limited capital for such investment could be one of those other constraints. In addition, we do not know if the programme coolers replaced the Sameer coolers, or if they were used as additional coolers. Hence, another constraint could be limited cooler capacity. Cooperatives might not be able to increase their volume of milk sales in case of replacing the Sameer coolers or they still keep the Sameer coolers to increase their cooler capacity.

Furthermore, the treatment and control areas were less comparable than anticipated. While differences in baseline levels (of outcomes) between the control and treatment group are not problematic for the differencesin-differences methodology, an identifying assumption is that trends in both groups are equal in the absence of treatment. The common trend cannot easily be tested. Nevertheless, the two groups are fairly different. The control areas are not organized in dairy unions. In addition, the control area is more dependent on milk than the treatment area. The farmers in the treatment area often also grow matoke. We would expect that these differences would result in over- rather than underestimation of the treatment effect. As there are limited positive findings, this seems to be a minor issue.

Moreover, the end line survey took place in July while the baseline survey was in April. Seasonal differences between these months could influence the results.

Finally, some unanticipated events took place. The construction of the Pearl factory increased competition for the cooperatives. This could prevent the cooperatives from attracting farmers to sell them more milk. Additionally, a dairy cooperative society disintegrated in the control area. It is however unlikely that the latter has greatly influenced the findings.

Recommendations

Based on these findings we present 7 recommendations for improved food security programmes.

- 1. EKN used the intervention logic to set out the different pathways to food security. The intervention logic is an ambitious effort to integrate a diversity of factors influencing food security. Improving public functions represents an important share of the enabling environment and regarding the intended synergies. In the programme this takes a prominent place with two projects dedicated to this and other projects making contributions. The intervention logic, however, does not represent this importance well. *In its approach the EKN could be clearer on the pathways through which influencing public institutions and policies could operate*.
- 2. The synergy between economic cooperation and food security is a precarious one. A focus on economic cooperation easily leads to targeting those people with most potential, who might already be in a position to make the step towards successful farming. The approach of EKN is based on a longer-term vision, to contribute to economic development, with benefits for all of society. *EKN could consider describing in its strategy how food insecure people would actually be reached and requesting from development partners that this is clear in their project strategies.* In the implementation by projects this could then be better monitored, also through documentation of the baseline on food security levels.
- 3. The reporting of results by projects is not completely aligned with the objectives of EKN regarding food security. The cross-cutting themes are not commonly reported on, and include gender, youth and climate change. A more structured approach to reporting could enable monitoring on all aspects that are central to current and future food security. In this respect *EKN could take more of a leading role and for example establish common indicators on the most important themes or set certain definitions, for example the definition of "smallholder farmer" was not uniform.* This could also promote the sharing of knowledge and experience.
- 4. *The sustainability of many projects is an important concern.* EKN considers sustainability mainly as a result from successful private sector engagement in projects, integrating the activities with existing value chains. For several projects where sustainability is indeed dependent on private sector demand for the new activities, the private sector engagement is not guaranteed. This can be done through market studies to determine what skills, resources and products are most needed from a demand perspective and developing projects accordingly. Another important risk are construction projects in which responsibility for maintenance is handed over to the government, but not ensured in the government's budget. The limited sources and lack of committed funding run the risk that the facilities and roads will not be maintained properly. Public-private partnerships might be a solution to overcome these risks, but they do require solid and reliable agreements.
- 5. Additionally, *it is important to consider the potential down-sides that might be associated with promoting use of inputs such as financial loans and equipment that is bought using a loan.* Either for individual farmers or for cooperatives. If the inputs do not (directly) have the intended production and revenue increasing effects, they could actually lead to lower net earnings, lower prices being paid to farmers and a reduction of food security. Promotion of these interventions should therefore not be indiscriminately done but rather based on a good understanding of the risks and probability of success, taking into account the specific context.
- 6. Furthermore, the continuation of some projects is only guaranteed by a new proposal that is prepared by the (international) lead party of the organisation. As a result, *these projects stay dependent on the continued support of EKN or other donors.* The focus should be more directed to gaining income from other sources as well as gaining incomes through Ugandan partners themselves.

7. The envisaged synergies within the portfolio could have been more effective. While there were some deliberate linkages, the partnerships were still relatively 'loose'. The current focus throughout the portfolio on promoting farming as a business and access to food allowed the projects to create important synergies and allowed the programme to remain manageable for EKN. EKN will most likely include Land rights and Nutrition in the new programme. *We advise EKN to guard itself from making the portfolio too diversified, with topics that do not provide very strong opportunities for mutually reinforcing cooperation.*

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Abbreviations and Acronyms

| ABC | AgriBusiness Cluster |
|-----------|---|
| aBi-Trust | AgriBusiness Initiative Trust |
| AfDB | African Development Bank |
| AIID | Amsterdam Institute for International Development |
| AFRISA | Africa Institute of Strategic Animal Resource Services and Development |
| ANOVA | Analysis of Variance |
| ВЕМО | Appraisal Document ("BeoordelingsMemorandum") |
| BMI | Body Mass Index |
| BTVET | Business, Technical and Vocational Education and Training |
| CFSVA | Comprehensive Food Security and Vulnerability Analysis |
| CICS | Competitiveness and Investment Climate Strategy |
| DANIDA | Danish International Development Agency |
| DDA | Dairy Development Authority |
| DEC | Dietary Energy Consumption |
| DFID | Department for International Development |
| DISP | National Dairy Development Strategy and Investment Plan |
| DSIP | Agricultural Sector Development Strategy and Investment Plan |
| EAC | East African Community |
| EKN | Embassy of the Kingdom of the Netherlands |
| EU | European Union |
| FDOV | Faciliteit Duurzaam Ondernemen en Voedselzekerheid (Facility for |
| | Sustainable Entrepreneurship and Food Security) |
| FGD | Focus Group Discussion |
| FS | Food Security |
| FSS | Food Security Survey |
| GoU | Government of Uganda |
| IDA | International Development Association |
| IFAD | International Fund for Agricultural Development |
| IOB | Directie Internationaal Onderzoek en Beleidsevaluatie, formerly known as Inspectie Ontwikkelingssamenwerking en Beleidsevaluatie (evaluation department of the Ministry of Foreign Affairs) |

| IRC | Institutional Research Committee |
|--------|---|
| KfW | Kreditanstalt fur Wiederaufbau (KfW Development Bank) |
| KIT | Royal Tropical Institute |
| MAAIF | Ministry of Agriculture, Animal Industry & Fisheries |
| MASP | Multi Annual Strategic Plan |
| MCC | Milk Collection Centre |
| MFA | Ministry of Foreign Affairs |
| MFS | Mede financieringsstelsel (grant programme for Dutch (Netherland)) |
| MUST | Mbarara University of Science and Technology |
| NDP | National Development Plan |
| NTM | Non-Tariff Measures |
| ORIO | Ontwikkelingsrelevante Infrastructuurontwikkeling (Facility for Infrastructure Development) |
| PCA | Principal Component Analysis |
| PNSD | Plan for National Statistical Development |
| PPA | Performance Planning and Assessment |
| PwC | PricewaterhouseCoopers Advisory N.V. |
| RDE | Royal Danish Embassy |
| SACCOs | Saving and Credit Cooperative Societies |
| ToR | Terms of Reference |
| UBOS | Uganda Bureau of Statistics |
| UCCCU | Uganda Crane Creameries Cooperative Union |
| UNAP | Uganda Nutrition Action Plan |
| UNHS | Uganda National Household Survey |
| UNPS | Uganda National Panel Survey |
| USAID | United States Agency for International Development |
| WHO | World Health Organization |

1. Introduction

This report presents the findings of the impact evaluation on the Dutch food security programme in Uganda in the period 2012-2015. This impact evaluation is part of a broader policy evaluation by Policy and Operations Evaluation Department (IOB) of the Ministry of Foreign Affairs (MFA) of the Government of the Netherlands. The countries included in this evaluation are: Bangladesh, Ethiopia, Rwanda and Uganda. The consortium of Stichting Amsterdam Institute of International Development (AIID) and PricewaterhouseCoopers Advisory N.V. (PwC) has been commissioned to review the food security programmes in Rwanda and Uganda.

1.1. Scope of the evaluation

evaluation approach was presented to IOB February 2014.

The Dutch food security portfolio in Uganda consists of nine decentrally managed projects presented in Table 4.

| Project number | Project name | Implementing organisation |
|-------------------|--|--|
| 23473 | Operationalisation DSIP | World Bank |
| 23614 | KAM Support Fund Food Security | Various, including: NABC and Agriterra |
| 23615 | Support to aBi-Trust for Dairy | AgriBusiness Initiative Trust (aBi-Trust) |
| 23616 | KAM-CATALIST UGANDA | IFDC |
| 23617 | KAM integrated Seed Sector Development in Uganda (ISSD-Uganda) | Wageningen UR Centre for Development Innovation (WUR-CDI) |
| 23618 | KAM-Agri-skills 4 you | ICCO Regional office Central & Eastern & Africa |
| 23619 | KAM support to TradeMark East Africa - Uganda program (Intraregional Trade) | Trade Mark East Africa |
| 23620 | PASIC - Policy Action for Sustainable Intensification of Cropping Systems (Agri Policy Action) | International Institute of Tropical Agriculture (IITA) |
| 25882 | KAM Financial Inclusion | DFCU/Rabo Development |
| Table 4 - | Project Portfolio Food Security Programme | e in Uganda 2012-2015 |

In brief, the method of evaluation was as follows. The evaluation of the Food Security Programme 2012-2015 started in 2013. First, the inception phase focused on gaining knowledge of the programme related documentation and establishing working relationships with the Embassy in Kampala and local partners, including PwC Uganda. An inception visit was conducted in November 2013. The inception meeting organised by IOB (2013) with all evaluators working on Food Security country evaluations in Bangladesh, Ethiopia, Rwanda and Uganda provided further guidelines for the evaluation. The inception report including the

Second, the baseline report was conducted and finalised in 2015. The baseline report included all findings of the conducted desk research on project-level documentation, such as appraisal documents, annual reports, mid-term reports, and (if available) final reports. A field visit was conducted in April 2014.

Lastly, the end line evaluation has been carried out. In preparation of the end line evaluation a one-day workshop was organised by IOB (2016) with all evaluators working on Food Security country evaluations in Bangladesh, Ethiopia, Rwanda and Uganda to ensure a consistent approach of all country evaluations. A qualitative portfolio evaluation has been conducted for the projects named above. For the aBi-Trust project an in-depth quantitative evaluation was done. The evaluation period focuses on the years 2012 until 2015. The data for the complete evaluation was collected between 2014 and 2016. During the end line phase three evaluations were completed:

A. The portfolio evaluation of all nine projects (excluding aBi-Trust) for a standard assessment. This assessment is based on desk research and interviews during the endline visit.

- B. The in-depth qualitative evaluation of three projects⁵.
- C. The in-depth quantitative and qualitative evaluation of the aBi-Trust project (23615).

1.2. Brief background on the EKN policy-context

Uganda is one of the 15 focus countries in the Dutch development cooperation policy. In recent years the Dutch development cooperation policy is transforming its relations with focus countries 'from aid to trade'. This focus also characterizes the Dutch-Ugandan relationship. The Netherlands not only provides support to improve food security, but also aims at creating an enabling environment for trade. This is in line with the current policy as was described in the policy agenda of Minister Ploumen: A world to gain: A new agenda for aid, trade and investment published in April 2013⁶. Furthermore there is also the food security policy letter of 18 November 2014⁷.

1.3. Structure of the report

The report commences (in Chapter 2) with a background on the food security situation in Uganda, including characteristics of food security, national policies and other donor programmes during the evaluation period.

Chapter 3 includes the impact evaluation of the projects in Uganda. The following evaluation questions (as based on the ToR (2013) by IOB) are used in this programme evaluation:

- 1. What is the composition and motivation for the Dutch Food Security Country Programme 2012 –2015 in Uganda? (discussed in section 3.3)
- 2. Which instruments are being used and what is the synergy in tackling food insecurity? (section 3.4)
- 3. How does the expenditure relate to the number of directly and indirectly targeted beneficiaries, and to the expected food security effect per beneficiary? (section 3.5)
- 4. What are the effects of a) the Dutch country programme, and b) the selected project, on food security? (section 3.6)
- 5. What can be said about the efficiency or cost-effectiveness of the food security interventions? (section 3.5⁸)

The aBi-Trust Dairy project was selected by IOB for an in-depth quantitative project level evaluation. The analysis and the conclusions of this project level evaluation can be found in Chapter 4. Support to aBi-Trust for Dairy is a project that intends to strengthen market access of the dairy value chain and the different actors in the target geographical area, the South Western Milk Shed. This study consists of a before-after study at the cooperative level, using a sample 48 cooperatives, and farmer level, using a sample of 840 farmers in the baseline and 700 farmers in the end line. The evaluation topics include:

- The milk prices received by cooperatives and their bargaining position
- Volumes of milk bought and sold and business transactions with and without the use of cooler
- Adoption of techniques by farmers in animal health management
- Improvements in use of milk production materials by farmers
- Quantities of milk sold by farmers to the cooperatives and prices received

Chapter 5 summarizes the main findings related to the five evaluation questions and reflects on the programme as a whole. The hypotheses are answered in this chapter.

Additional reference material is included in the Annexes, which are included in a separate document.

⁵ The projects 23618 Agri-Skills 4 You, 23619 Intra-regional trade and 25582 Financial Inclusion were selected for this indepth study. The method entailed interviews with local staff (implementing staff, regional office, or partner NGO). Additionally, Focus Group Discussions took place for the first two projects.

 $^{^{6}\} https://www.government.nl/documents/letters/2013/04/05/global-dividends-a-new-agenda-for-aid-trade-and-investment$

 $^{^7\,}https://www.rijksoverheid.nl/documenten/kamerstukken/2014/11/18/kamerbrief-over-nederlandse-inzet-voor-wereldwijde-voedselzekerheid$

⁸ The beneficiary and cost-effectiveness analysis have been combined and included in section 3.5, before the project-level effectiveness discussion in section 3.6, to benefit the structure and logical flow of the report.

2. Food Security Situation in Uganda

2.1. Introduction

This chapter examines the food security situation in Uganda. First, section 2.1 provides an introduction to the country context of Uganda and the concept of food security. Second, characteristics and causes of food (in)security in Uganda are discussed in section 2.2. Three main questions will be answered: 1. Where and who are the food insecure? 2. What are the food insecurity characteristics and underlying causes? 3. What are the trends of food insecurity over the period 2012-2015? Third, section 2.3 elaborates on the national policies of the Government of Uganda relating to food security. And lastly, (food security) programmes of other donors in Uganda are detailed in section 2.4. Section 2.5 summarizes all findings discussed in this chapter.

2.1.1. Uganda country context

The landlocked Republic of Uganda is situated in East Africa, surrounded by South Sudan in the North, Kenya in the East, Tanzania in the South, Rwanda in the South West and the Democratic Republic of Congo in the West. The country comprises a total of 241,038 sq. km (93,072 sq. miles) and has a high population density with a population of 39.03 million (2015). Despite its troubled past, including a military coup, dictatorship and 20-year insurgency in the North, the East African nation is now moving towards stability and prosperity. Uganda has one of the fastest growing economies in Africa⁹. In 2014, GDP amounted to \$27.00 billion and GDP growth was 4.8%¹⁰ (average annual growth of 5%). The majority of the population is employed in the agricultural sector (65.5 % of total employed in 2015) and unemployment is relatively low (4.2% of labour force)¹¹. Between 1980 and 2014 Uganda's Gross National Income per capita increased by about 123.1 percent and was (current) US\$ 681.5 in 2013¹².

However, economic progress has not been sufficient and Uganda is still a low-income country. The Human Development Index for Uganda is 0.483 (rank 163), placing the country at the low performing end of the world list¹³. Food security remains a challenge and the situation has recently been deteriorating (especially in the North-East). Although Uganda made significant progress in reducing the population that suffers from hunger (Millennium Development Goal 1), the country still loses some US \$899 million (5% of GDP) annually due to the effects of malnutrition¹⁴. Uganda has one of the world's youngest populations (almost half of its people under 15-years of age) and a high fertility rate (5.7 children per woman in 2015). The high population growth (average annual of 3% in 2010-2015) leads to a high dependency ratio, and consequently puts pressure on food security. Therefore, Uganda needs to invest in nutrition-related policies and programmes to improve the livelihood of its population. In addition, there are other development challenges, such as low levels of productivity (both agricultural and non-agricultural sectors), inappropriate urban development, slow development of infrastructure, and limited availability of credit.

2.1.2. Food security

In order to analyse food security in Uganda, we first elaborate on the concept of food security. The World Food Summit (1996) defined food security as prevailing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life". Additionally, the World Health Organization (WHO) currently defines the concept of food security as "including both physical and economic access to food that

⁹ World Food Programme. (2013). Malnutrition costs Uganda 5 cent of GDP. 18 June 2013. Retrieved from: https://www.wfp.org/stories/malnutrition-costs-uganda-5-cent-gdp

¹⁰ World Bank. (2016). Uganda. Retrieved from: http://www.worldbank.org/en/country/uganda

¹¹ UNDP. (2015). Human Development Report 2015. Work for human development. Briefing note for countries on the 2015 Human Development Report Uganda. Retrieved from: http://hdr.undp.org/sites/all/themes/hdr_theme/countrynotes/UGA.pdf

¹² Ibid 3 and United Nations Data. (2016). Uganda. Retrieved from:

http://data.un.org/CountryProfile.aspx?crName=uganda#Economic

¹³ UNDP. (2015). Uganda country profile. http://hdr.undp.org/en/countries/profiles/UGA

¹⁴ Ibid 1.

meets people's dietary needs as well as their food preferences". Today about 795 million people are undernourished globally¹⁵. The widely accepted definition of food security is built on four pillars¹⁶:

- Food availability: sufficient quantities of food available on a consistent basis.
- Food access: having sufficient resources to obtain appropriate foods for a nutritious diet.
- Food utilization: appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.
- Food stability: having access to adequate food at all times, influenced by available assets.¹⁷

The World Food Programme has classified food security in four different food security levels. The Comprehensive Food Security and Vulnerability Analysis (CFSVA) is published for all developing countries every three years. Households are characterized along four descriptive groups of food security: *food secure*, *marginally food secure*, *moderately food insecure* and *severely food insecure* (CFSVA, 2013)¹⁸. Figure 1 below explains the differences between the categories.

| Food secure | Able to meet essential food and non-food needs without engaging in atypical coping strategies. These households have an acceptable food consumption and use a low share of their budget to cover food needs. | Food | |
|-----------------------------|--|----------|--|
| Marginally food secure | Marginally food secureThe vast majority have an acceptable diet although a considerable number of households use a high share of their budget to cover food needs and sometimes engage in negative coping strategies in order to acquire enough food. | | |
| Moderately food insecure | Significant food consumption gaps. These households use a high share of their budget to cover food needs and the majority of households have to use negative coping strategies in order to make a living, although only a few use the more serious coping strategies. | | |
| Severely food insecure | Poor food consumption and the majority of households are using a very high share of their budget to acquire food. Almost half of these households have used one of the most serious irreversible coping strategies with the resulting risk of further deteriorating their food security situation. | insecure | |

Figure 1 – Description food security categories of the food security index (CFSVA, 2015)

2.2. Food insecurity in Uganda

With a Global Hunger Index (GHI) of 27.6¹⁹ in 2015, Uganda faces a 'serious' problem in terms of food security and the well-being of its population²⁰. According to the Global Food Security Index (GFSI), Uganda ranks 81 out of 113 index countries²¹. Table 5 summarizes the scores on key food security indicators for Uganda in 2016²². On average, people in Uganda consume about 2,279 kcal per day, with the intensity of food deprivation 172 kcal per person per day²³. This means that the population, on average, falls short on the required dietary

¹⁵ FAO. (2015). The State of Food Security in the World 2015. Retrieved from: http://www.fao.org/3/a-i4646e.pdf ¹⁶ FAO. (2006). Food Security. Policy brief. June 2006, issue 2. Retrieved from: http://www.fao.org/forestry/13128-0e6f36f27e0091055bec28ebe830f46b3.pdf

¹⁷ UNDP. (2012). A Human Development and Capability Approach to Food Security: Conceptual Framework and Informational Basis.

¹⁸ The 2013 version of CFSVA is the most recent version since a new version is planned for 2017.

¹⁹ 100 point scale: 0 – best, 100 – worst. <9 = low, 10.0-19.9 = moderate, 20.0-34.9 = serious, 35.0-49.9 = alarming, 50.0> = alarming.

²⁰ Global Hunger Index. (2015). Uganda. Retrieved from: http://ghi.ifpri.org/countries/UGA/

²¹ 1 = most food secure (USA), 113 = least food secure (Burundi). The Economist Group. (2016). Global Food Security Index. Uganda. Retrieved from: http://foodsecurityindex.eiu.com/Country/Details#Uganda

²² From the GHI (2015), World Bank (2016) and the Global Food Security Index (2016).

²³ "It is measured as the difference between the minimum dietary energy intake and the average dietary energy intake of the undernourished population" (The Economist Group, 2016).

energy intake for Uganda with 172 kcal per person per day²⁴. Furthermore, according to international standards, in 2012 33.2% of the population in Uganda lived below the global poverty line of US\$1.90 per day²⁵.

| Country data | | | |
|---|------|--|--|
| Proportion of undernourished in population (%) | 25.5 | | |
| Prevalence of wasting in children under five years (%) | 4.8 | | |
| Prevalence of stunting in children under five years (%) | 33.7 | | |
| Under five mortality rate (%) | 6.6 | | |
| Life expectancy at birth (years) | 58.5 | | |
| Population below global poverty line (%) | 33.2 | | |
| Household expenditure for food (%) | 27.2 | | |
| Table 5 – Detailed food security score for Uganda 2015/2016 ²⁶ | | | |

This section discusses the characteristics of food insecure households in Uganda, including the distribution across regions in Uganda, as well as the main causes of food insecurity in Uganda. Thereafter food insecurity trends for the period 2012-2015 are outlined.

2.2.1. Characteristics of food insecure households2.2.1.1. Where are the food insecure?

Except for caloric deficiency, food insecurity is a rural phenomenon in Uganda. As Figure 2 illustrates, the people living in rural areas are more likely to have unacceptable food consumption and to be food insecure, especially in the Northern and Eastern regions of Uganda.



Figure 2 - Percentage of households with poor or borderline food consumption



Figure 3 - Administrative map of Uganda showing borderline of food consumption regions and districts (FC) (CFSVA, 2013)

 $^{^{24}}$ FAO. (2011). Minimum dietary energy requirement Uganda. Retrieved from: http://www.fao.org/economic/ess/ess-fs/fs-data/ess-fadata/en/

²⁵ World Bank. (2016). Poverty & Equity. Country Dashboard Uganda.

http://povertydata.worldbank.org/poverty/country/UGA

²⁶ Household expenditure on food retrieved from GFSI (2016)

The percentage of people suffering from food deficiency²⁷ is largely similar across regions (and rural vs. urban) except for the Northern region of Uganda, which is far higher than other regions (see Figure 4). The dietary diversity²⁸ varies significantly among the regions (see Figure 5). The difference between urban and rural areas is large in this respect. It is remarkable that especially the Western region has low dietary diversity.





Figure 4 - Percentage of population that are energy deficient (CFSVA, 2013)

Figure 5 – Percentage of households with low dietary diversity (CFSVA, 2013)

While the food security in the Northern region in general is lowest in Uganda, the food insecurity situation is the most severe in the North-Eastern region of Karamoja (see Figure 6). Since April 2015 a crisis situation has been observed due to declining food availability and access since lean season started in January. "In Karamoja, the reduced livestock terms of trade are negatively impacting access to food for poor livestock herders" (FSNWG, 2015). The food security trends are discussed in section 2.2.3, providing further details on the worsening situation in Karamoja.



Figure 6 – Acute food insecurity in Uganda in May 2015 (FSNWG, 2015²⁹)

²⁷ When the regular diet fails to provide one with the minimum dietary energy requirement to lead an active and healthy life (CFSVA, 2013: 1).

²⁸ Defined as "They consumed food from fewer than five out of seven food groups in the week leading up to the survey" (CFSVA, 2013: 1).

²⁹ Food Security and Nutrition Working Group (FSNWG). (May 2015). Current conditions – Uganda. Retrieved from: http://www.ipcinfo.org/fileadmin/user_upload/ipcinfo/docs/FSNWG%20Situation%20Analysis%20Update%20May%202 015.pdf

2.2.1.2. Who are the food insecure?

Food security is inextricably linked to poverty. The poorer the household, the lower the food consumption and dietary diversity. Notwithstanding Uganda's progress in reducing poverty, the absolute number of people living in poverty has increased due to high population growth (CFSVA, 2013). In 2013, 30% of all rural people (making up 87% of all Ugandans) lived below the national rural poverty line³⁰. As stated in Uganda's Food and Nutrition Strategy (2004), many Ugandans fall into the food insecurity and poverty trap illustrated by Figure 7. This prevents them from intensifying farming activities, providing for their families and creating new opportunities. This then also becomes a trap for communities in areas where the poverty trap is prevalent and hampers development and investment. Households in rural areas are therefore most vulnerable.



Figure 7 – Food insecurity and poverty trap (Republic of Uganda, 2004: 7³¹)

Female-headed households are especially vulnerable to food insecurity. "A quarter of households headed by a woman have inadequate food consumption compared with about a fifth of those headed by a man" (CSFVA, 2013: 19). In addition, 46% of female-headed households have low dietary diversity (36% for male-headed households). Women (head of household) are more likely to be food insecure as they have a higher risk to poverty: they are less likely to get loans or access credit, they often lack schooling and are more often illiterate than men (which leads to lower paid jobs). In the Northern region of Uganda only 26% of female household heads are literate, compared to 78% of male household heads. Table 6 summarizes the gender dimension on food security, categorized by the food security indicators. As the numbers show, women have more problems with food availability than men (less livestock, less access to land and lower food stocks) and consequently spend less on food. Therefore, there is a slightly higher percentage of food insecure women compared to men. However, the overall food security scores do not show a large difference between men and women.

³⁰ The official poverty line in Uganda is based on an analysis from the 1992 household budget survey and draws to poverty lines, for food and non-food essentials. A household is classified as poor when its total expenditure per capita falls below these lines. "The food poverty line represents the cost of a food bundle of the poorest 50% of the population that provides the necessary energy requirements per person per day (around 2,300 kilocalories). The non-food poverty line represents an allowance for basic non-food needs of the population whose total consumption is near to the food poverty line" (CFSVA, 2013: 17).

³¹ Republic of Uganda. (2004). Uganda Food and Nutrition Strategy and Investment Plan. Retrieved from: https://extranet.who.int/nutrition/gina/sites/default/files/UGA%202004%20FoodandNutritionStrategyAndInvestmentPlan.pdf

| Domain | Indicator | Female Headed | Male Headed |
|----------------|-------------------------------|------------------|----------------|
| Demostration | No formal education - % | 79 | 66 |
| Demography | Programme participation - % | 62 | 56 |
| | Own livestock - % | 38 | 48 |
| Availability | Have access to land - % | 84 | 88 |
| | Have food stocks | 32 | 33 |
| | Atleast one income earner - % | 71 | 70 |
| | Monthly food exp av. (UgX) | 47,000 | 57,000 |
| Access | Households with FES <65% - % | 64 | 68 |
| | Have debt - % | 31 | 38 |
| | Borrowed to buy food | 51 | 51 |
| | Acceptabe FCS - % | 48 | 52 |
| Utilization | Low DDS - % | 42 | 39 |
| | Use surface water - % | 10 | 12 |
| | Use atleast 15L pppd - % | 21 | 18 |
| | RCSI - average | 15 | 16 |
| Stability | Alcohol consumption - % | 25 | 26 |
| | No livelihood coping - % | 38 | 26 |
| | Food Secure - % | 15 | 14 |
| Overall Food | Marginally Food Secure - % | 38 | 42 |
| Classification | Moderately Food Insecure - % | 39 | 36 |
| | Severely Food Insecure - % | 8 | 8 |

Table 6 – Gender comparison food security indicators and influencing factors (WFP and UNICEF, 2015: 8³²)

Effects of food insecurity on children in poor households is severe. Poor households tend to include more stunting and underweight children. "Malnutrition is the underlying cause of as many as 45% of child deaths in Uganda"³³. However, malnutrition of children is not only caused by a poor diet in a food insecure household. Inadequate maternal health care as well as poor access to health care and a healthy environment also cause child malnutrition in Uganda. In the period 2008-2012 13.8% of all children in Uganda were underweight, with 33.4% of all children stunting and 4.7% wasting³⁴. In 2011, the percentage of children under 5 years of age who were underweight was 14.1%, showing an improvement when compared to 16.4% in 2006³⁵. These forms of undernutrition in early life contribute to the poverty trap, as it leads to reduced physical and mental development at later age.

Another important characteristic of food insecure households is that they are most often engaged in subsistence farming. Households depending on subsistence farming form one fifth of the total Ugandan population. Their monthly expenditure is at just 46,100 Ugandan shillings equivalent a month (US\$19) and over half of that is spent on food.³⁶ Of all households dependent on agricultural production, the households only dependent on subsistence farming (and local remittances) have the highest level of food insecurity, whereas a combination of subsistence farming and non-agricultural income improves the food security situation (see Figure 8).

http://www.fantaproject.org/sites/default/files/resources/Uganda-HEALTH-brief-PROFILES-Sep2014_0.pdf ³⁴ Moderate and severe rates. UNICEF. (2015). Uganda statistics. Retrieved from:

http://www.unicef.org/infobycountry/uganda_statistics.html

35 FAOSTAT. (2015). Suite of Food Security Indicators. Uganda. Retrieved from: http://faostat3.fao.org/browse/D/FS/E

³⁶ UBOS 2009/2010 in CFSVA, 2013: 21

³² WFP and UNICEF. (2015). Food Security and Nutrition Assessment 2015. Retrieved from:

http://library.health.go.ug/publications/service-delivery-child-health/food-and-nutrition/food-security-and-nutrition-assessme-o

³³ FANTA project. (2014). Uganda health brief: Malnutrition in Uganda. Retrieved from:



Figure 8 – Food security indicators by agricultural livelihood groups (CFSVA, 2013)

This analysis leads us to the following list of characteristics mostly found in food insecure people in Uganda:

| Geographical characteristics | | Household characteristics | |
|------------------------------|---|---------------------------|------------------------------|
| i. | Living in rural areas | ii. | Poor households |
| iii. | North Eastern region of Karamoja is worst | iv. | Female-headed households |
| ۷. | Living in the North and East | vi. | Many children |
| vii. | Energy deficiency is nation wide | viii. | Subsistence farming |
| | | ix. | Low level of education |
| | | х. | Spend much of income on food |

Table 7 – Characteristics of food insecure in Uganda

2.2.2. Food insecurity characteristics and causes

What are the food insecurity characteristics and underlying causes?

Apart from the above more general descriptive characteristics we will detail the country's population's condition with regard to the four food security characteristics and causes: (national) food availability, household food access, food utilisation and stability in access.

2.2.2.1. National food availability

Household availability

As noted before, with a Global Hunger Index (GHI) of 27.6 in 2015, Uganda faces a 'serious' problem in terms of food security and the well-being of its population. The average dietary energy intake for Uganda is around 2,279 kcal per day, which is close to the minimum but by the WHO still classified as insufficient³⁷. Besides, these numbers provide the average energy intake over the entire population. A lack in availability in terms of energy or cereal equivalent might not be the main cause of the described levels of food insecurity.

Food production and distribution

The population of Uganda is mainly dependent on agricultural production and in particular self-produced food³⁸. Most Ugandans are engaged in farming. In 2014, 73% percent of the population over 10 years of age was directly employed in agriculture (83% of all women and 71% of all men)³⁹. Family farming not only provides an important source of food but also provides employment and income. Figure 9 displays the total amount of

³⁷ http://www.emro.who.int/health-topics/macronutrients/index.html retrieved on 22-12-2016.

³⁸ About 50% in 2012-2013 according to Uganda National Household Survey (2014) p. 113. Retrieved from: http://www.ubos.org/onlinefiles/uploads/ubos/UNHS_12_13/2012_13%20UNHS%20Final%20Report.pdf

³⁹ Fanta project. (2014). Household farming Uganda improves nutrition and livelihoods. 14 October 2014. Retrieved from: http://www.fantaproject.org/news-and-events/household-farming-uganda-improves-nutrition-and-livelihoods

agricultural production, exports and imports per main agricultural product in the years leading up to the programme⁴⁰. The numbers show a rapid increase in production particularly from 2008 to 2009 for rice and maize. This trend of increase in production has continued in recent years.

| Rice Production 162,000 MT 177,857 MT 205,765 MT 218,111 MT Wheat Production 19,000 MT 19,000 MT 20,000 MT 21,500 MT Maize Production 1,262,000 MT 1,266,000 MT 2,354,660 MT 2,373,500 MT Soybean Production 176,000 MT 178,000 MT 180,000 MT 175,000 MT | Agricultural Production | 2007 | 2008 | 2009 | 2010 |
|--|-------------------------|--------------|--------------|--------------|--------------|
| Wheat Production 19,000 MT 19,000 MT 20,000 MT 21,500 MT Maize Production 1,262,000 MT 1,266,000 MT 2,354,660 MT 2,373,500 MT Soybean Production 176,000 MT 178,000 MT 180,000 MT 175,000 MT | Rice Production | 162,000 MT | 177,857 MT | 205,765 MT | 218,111 MT |
| Maize Production 1,262,000 MT 1,266,000 MT 2,354,660 MT 2,373,500 MT Soybean Production 176,000 MT 178,000 MT 180,000 MT 175,000 MT | Wheat Production | 19,000 MT | 19,000 MT | 20,000 MT | 21,500 MT |
| Soybean Production 176,000 MT 178,000 MT 180,000 MT 175,000 MT | Maize Production | 1,262,000 MT | 1,266,000 MT | 2,354,660 MT | 2,373,500 MT |
| | Soybean Production | 176,000 MT | 178,000 MT | 180,000 MT | 175,000 MT |

Figure 9 - Total Agricultural Production (IFPRI, 2012)

Farmers in Uganda are mostly engaged in the cultivation of maize, banana, grain, beans, root crops (cassava, potatoes) and livestock farming. The top 3 crops produced are: cassava, plantain and sweet potatoes; the top 3 livestock products are: eggs, milk and meat from indigenous cattle⁴¹. Production differs per region. Maize and rice production is highest in the East, sorghum and cassava is mainly produced in the North, fruit and coffee are cultivated in the Midwest, and mixed crop and cattle in the north-eastern Karamoja region. Most arable land suitable for cultivation is available in the Northern districts, making it a region with potential for increased production. Yet, many of the lands are less accessible. It takes a fifth of the farmers at least two hours to reach their land (CFSVA, 2013: 27). This hinders frequent and sufficient cultivation, thereby forming an obstacle to food availability.

2.2.2.2. Seasonal food availability

Naturally, seasonal changes in food availability occur, related to seasonal harvesting and weather related changes. Figure 10 shows a typical year (seasonal calendar) in Uganda. Planting, weeding and harvesting are all dependent on the rainy seasons, of which there are two in the majority of the country. In general, farmers in Uganda make little use of irrigation systems. This means they are highly dependent on rain-fed crop production and vulnerable to climate changes, such as long periods of low rainfall or drought. If the rains are increasingly becoming more unpredictable, this affects production. Especially the north-eastern region (Karamoja) is seen as having unreliable climate condition.





Consequently, households often experience seasonal problems (so-called shocks) in terms of food availability and food security. Figure 11 illustrates that for the bimodal regions energy deficiency and poor diversity is

⁴⁰ IFPRI. (2012). Food Security Portal Uganda. Retrieved 22-8-2016 from: http://www.foodsecurityportal.org/uganda ⁴¹ Ibid 17.

highest around April. In December food security is best, as this is the period after the main/second harvest season. It is interesting to note that for the bimodal regions in July a high level of food insecurity is experienced according to Figure 11 while it falls within the harvesting season. The reason is that the food scarcity period runs from March to June, and might be extended to July depending on rainfall.⁴²



Figure 11 – Seasonality and selected food insecurity indicators for bimodal regions (excluding the North) (CFSVA, 2013)

In relation to this, declining soil fertility, climate change, pests and diseases, and low use of agricultural inputs are constraining agricultural productivity (FAO and IFPRI, 2015: 15⁴³). Moreover, smallholder farmers have limited storage possibilities for their harvested produce, which leads to losses of perishable products and in turn a smaller part of total production being available for consumption.

2.2.2.3. Household food access

Poverty is the root cause of food insecurity as poor households do not have access to resources to buy nutritious food. Household food access may be limited due to difficulties in terms of finance or infrastructure. For example, households lack the money to acquire inputs (seeds, technology, etc.) that boost their agricultural production and cannot access financial services (credit/loans) (CFSVA, 2013: 18). Additionally, land scarcity and access to land are also constraints to increasing agricultural production. Especially female-headed households experience problems in food access, since they earn less than male-headed households (UNICEF and WFP, 2015: 8). Furthermore, households mainly depend on markets to buy and sell their food. In remote rural areas smallholder farmers often do not have access to the required vehicles and roads to transport their products (CFSVA, 2013: 21).

Gross National Income (GNI) per capita in Uganda has increased throughout the years but recently growth has been stagnating (Figure 12). In 2015 the average GNI per capita was US\$ 670, having increased by 22% compared to 2010⁴⁴. These values have already been corrected for price increases, meaning that the real purchasing power of Ugandans has increased over the years. This is of course based on aggregated data and does not take account of the unequal distribution amongst the population.

⁴⁴ US670/US $550 \times 100 = 121.8\%$

⁴² Hunger season data, http://www.actionagainsthunger.org/hunger/the-hunger-season; impact of rainfall, http://www.fao.org/giews/countrybrief/country.jsp?code=UGA (retrieved on 03-09-2016).

⁴³ FAO and IFPRI. (2015). Leveraging agriculture for nutrition (LANEA). Country report Uganda. Retrieved from: http://www.fao.org/documents/card/en/c/abccff95-062f-4fd7-ba3b-917c994326b4/



Figure 12 – Gross National Income (GNI) per capita of Uganda (World Bank, 201645)

2.2.2.4. Stability in access

Stability in access is influenced by, for instance, natural shocks, price fluctuations and family diseases. In 2015, the majority (93%) of households in rural areas had suffered at least one shock in the 30 days before assessment (UNICEF and WFP, 2015: 6). These shocks often lead to coping strategies that are unsustainable or drive households into further food insecurity. In 69% of the households it became necessary to reduce the number of meals per day. The lack of a buffer in terms of different forms of assets, including livestock, savings, capital assets and food savings also reduce the ability of families to cope. The number of households saving money is low.

In particular, fluctuation in food prices are an important determinant of food security. Poor Ugandan households are net buyers of food and therefore prices impact their welfare. High food prices can lead to increased poverty and consequently an increase of food insecurity⁴⁶. As can be seen in Figure 13, in 2015 average prices for beans, maize grain and sorghum were high during April, May, September, October and November. The annual analysis demonstrates food prices were increased by 116% for beans, 41% for maize grain and 34% for sorghum when compared to 2014⁴⁷. The seasonal price fluctuations correlate to the production seasons discussed above, with low prices in harvest seasons and high prices in the 'lean periods'. Additionally, climate change related droughts in key producing regions, expanding population size, increasing export due to demand in neighbouring countries and incoming refugees all account for an increase in prices.

2.2.2.5. Food utilization

On an individual level food security is highly dependent on the quantity and the quality of the consumption of different food types. There are several challenges to food utilization in Uganda, including storage and hygiene for food preparation. Figure 14 illustrates the Ugandan food consumption in terms of median dietary energy consumption (DEC) (kcal/person/day) for different categories. In the years 2012-2013 average energy intake in Uganda was 2157 kcal. As can be expected, people in the lowest quintile also had the lowest DEC (1523 kcal/person/day). Additionally, the Northern regions (North East and Mid-North) have lower energy intakes.

Besides energy intake, the dietary diversity of the Uganda population also differs among the various populations. Figure 15 shows, for example, that food diversity in Kampala is highest while dietary diversity in the North East is lowest.⁴⁸ This corresponds to the food security situation in these regions. According to the UNAP 2011, Ugandans generally consume monotonous and unvaried diets, which frequently cause micronutrients deficiencies. Staples (cereals, roots and tubers) constitute 68% of the Ugandan DEC. Nationally, 29% of all Ugandan households has low dietary diversity, while 38% of the Ugandan population was considered food energy deficient (Uganda Bureau of Statistics, 2014: 117). It is interesting to note that although the WFP and UNICEF. 2015 Food Security and Nutrition Assessment (section 2.2.1.2) shows that female-headed

⁴⁶ Van Campenhout, B. & Pauw, K. & Minot, N. (2013). The Impact of Food Price Shocks in Uganda: First-Order versus Long-Run Effects. *IFPRI Discussion Paper 01284*.

⁴⁵ World Bank. (2016). World Development Indicators. Retrieved from:

http://databank.worldbank.org/data/reports.aspx?source=2&country=RWA&series=&period=#

⁴⁷ Comparison between December 2014 and December 2015 rates (excluding Karamoja region)

⁴⁸ Although not all food types are necessarily valuable for their energy levels, for purposes of comparing the dietary diversity Figure 16 does give a useful overview of the distribution of consumed food types.

households are often worse off in terms of income and dietary diversity, Figures 14 and 15 show that this is generally not the case in Uganda.







Figure 14 – Median Dietary Energy Consumption (DEC) (Kcal/person/day) (Uganda Bureau of Statistics, 2014: 108)

⁴⁹ WFP. (2015). WFP Uganda monthly market bulletin – December 2015. Retrieved from: http://documents.wfp.org /stellent/groups/public/documents/ena/wfp281720.pdf?_ga=1.59881445.951220100.1462794879


Figure 15 – Share of DEC from food groups by categories (Uganda Bureau of Statistics, 2014: 116)

In addition, health and sanitation impact on nutritional uptake. Poor households have inadequate access to safe drinking water and sanitation, which limits the utilization of available food and may risk disease outbreaks and malnutrition (CFSVA, 2013: 25). With a prevalence of 25% amongst children under 5 years, diarrhoea limits the nutritional value taken up after consumption. An estimated 1.5 million people in Uganda lived with HIV in 2015, which causes vulnerability to diseases that further reduce nutritional uptake.

This analysis affirms the characteristics and causes for food insecurity in Uganda based on the key indicators:

| Food availability | Access to food |
|--|---|
| xi. Increasing but low levels of production | xii. Low incomes, although increasing |
| xiii. Seasonal fluctuations in production | xiv. Rising food prices |
| xv. Idle and difficult to reach arable lands | xvi. Women earn less and less access to inputs |
| xvii. Lack of storage systems | xviii. Remoteness from markets |
| Food utilization | Stability of access |
| xix. Low diversity in consumption | xx. Food price fluctuations |
| xxi. Low energy consumption | xxii. Exposure to shocks: e.g. drought, illness |
| xxiii. Poor health conditions | xxiv. Lack of savings and stock assets |
| | ** 1 |

Table 8 - Key indicators of food insecurity in Uganda

2.2.3. Food insecurity trends

What are the trends of food insecurity over the period 2012-2015?

In the description of the food security characteristics in Uganda we have already touched upon some trends. Here the level of undernourishment over the period 2012-2015, and the forecast for the longer term are described. The main trends influencing the food security situation relate to population growth, changing climate conditions and migration.

Figures 16 and 17 display the trends in undernourishment (%) and average dietary supply adequacy (%) in Uganda from 1991 to 2015. These graphs show the situation in Uganda is quite stable as of 2008. However, undernourishment seems to be slightly increasing when compared to 2005, whereas average dietary supply adequacy is decreasing since 2004.





Figure 17 - Average dietary supply adequacy⁵¹ (%) (FAOSTAT, 2015)

Forecasts by the United States Department of Agriculture (2014) project a deepening of food insecurity in Uganda in 2014-2024⁵². The nutrition gap, the gap between available food and food needed to support a per capita nutritional standard, is expected to increase from 0 in 2014 to 337,000 tons in 2024. The distribution gap, the amount of food needed to raise consumption in each income quintile to the nutritional standard, is expected to increase from 235,000 tons in 2014 to 884,000 tons in 2024 (USDA, 2014: 38-39). In addition, an increase in the number of food insecure people is anticipated, from 19 million people (50% of the population) in 2014 to 41 million in 2024 (80% of the expected population).

This deterioration is mainly driven by the country's high population growth, 3.2 % in 2014 (one of the highest in the world). This was also evident in the baseline report since population growth in 2012 was 3.4% Figure 18 shows the population of Uganda is growing exponentially since the 1960s. In 2015, the population amounted to 39,032,383 people, which means the population has more than tripled since 1980⁵³. The expected population in 2024 would be 66 million. The government does not have an active family planning policy and the birth rate per women is 6.9 compared with an African average of 5.1⁵⁴.

⁵⁰ FAOSTAT. (2015). Food Security Indicators. Retrieved from: http://faostat3.fao.org/browse/D/FS/E

⁵¹ The baseline of 100% indicates adequate dietary supply

⁵² United States Department of Agriculture (USDA). (2014). International Food Security Assessment 2014-2024. Retrieved from: http://foodsecurityindex.eiu.com/Country/Details#Uganda and

https://www.ers.usda.gov/webdocs/publications/gfa25/48262_gfa25_final-0708.pdf

 $^{53 (39,032,383/12,547,754 \}times 100 = 311\%).$

⁵⁴ http://www.worldwatch.org/node/4525 (retrieved at 3-9-2016).



Figure 18 – Population Uganda, total (World Bank, 201655)

Furthermore, the country is largely dependent on domestic production performance, grains and root crops account for more than half of the country's diet. Although grain production growth is expected to match the population growth, increases in root crops is expected to fall short of population growth.⁵⁶ Consequently, per capita consumption is projected to decline and food insecurity to rise. Climate change and migration also negatively affect the food security situation, as will be discussed below.

2.2.3.1. Climate change

Additionally, climate change affecting agricultural production forms an increasing threat to food security in Uganda. While short rains, in the right amount and at the right time (from October to December) allow for "the regeneration of pasture, improve crop conditions and boost casual agricultural labour opportunities for poor households", El Niño, which annually occurs around December, is prone to cause either long droughts or heavy rains (IRIN, 2015⁵⁷). Both flooding and droughts can lead to crop failure, reducing food availability. Moreover, long heavy rains cause animals that are already weak from the dry season to succumb to exposure and can trigger waterborne diseases like cholera and typhoid (or Rift Valley Fever (RVF), a viral mosquito-borne disease, for livestock). In addition, rains can cause flooding and thereby reduce food accessibility. In 2015, the Government of Uganda has undertaken an unprecedented evacuation mission and called on 800,000 people to relocate to safer areas as they were regarded at risk from landslides in mountainous regions.

2.2.3.2. Regional climate trends

The food security situation in the North-eastern (unimodal) Karamoja region is particularly deteriorating as a result of erratic and poorly distributed rainfall. In 2013, the GoU already alarmed that this situation could affect 1.2 million people in Karamoja (IRIN, 2015⁵⁸). Crop production went down due to the unfavourable climate conditions, which even led to deaths due to malnutrition and hunger. Therefore, the government was forced to scale up food distribution to Karamoja (after ending regional support in 2012). However, these efforts have not been sufficient. Currently, as of January 2016, the Karamoja region is considered a "crisis situation". At least 640,000 people (half of the Karamoja population) are facing food shortages due to the long droughts; their food stocks had already depleted in December 2015. In the bimodal areas El Niño actually benefited agricultural

https://www.ers.usda.gov/webdocs/publications/gfa25/48262_gfa25_final-0708.pdf

http://www.irinnews.org/analysis/2015/12/23

⁵⁵ World Bank. (2016). Population, total. Retrieved from:

http://data.worldbank.org/indicator/SP.POP.TOTL?locations=UG

⁵⁶ United States Department of Agriculture (USDA). (2014). International Food Security Assessment 2014-2024. Retrieved from: http://foodsecurityindex.eiu.com/Country/Details#Uganda and

⁵⁷ IRIN. (2015). An unwanted guest: El Niño and Africa in 2016. 23 December 2015. Retrieved from:

⁵⁸ IRIN. (2015). Food insecurity threatens 1.2 million in Uganda. 10 July 2013. Retrieved from:

http://www.irinnews.org/report/98393/food-insecurity-threatens-12-million-uganda% E2% 80% 99s-northeast

production around the same time, as beans, millet, sorghum, and Irish potato harvests were all average, while maize harvests were above average (FEWS NET, 2016⁵⁹). However, the increasing unpredictability of rainfalls in the period 2012-2015 have already led to extended lean and hunger periods in the bimodal areas as well.

2.2.3.3. Migration

Lastly, the increasing number of refugees fleeing into Uganda caused by civil conflicts in Burundi, the Democratic Republic of Congo, and South Sudan is also pressing on food security. According to the UNHCR statistics database in 2015, Uganda received 200,278 refugees from South Sudan, 30,553 refugees from Burundi and 219,895 refugees from the Democratic Republic of Congo, bringing the total number of refugees in Uganda to 519,772 (also including small numbers of refuges from other countries including for example, Eritrea, Sudan and Yemen ⁶⁰. In an attempt to minimize the effect on food availability, the GoU has allocated land to refugees so they can produce their own food, in addition to assistance from agencies such as the World Food Programme. However, it is questionable whether this is sufficient to ensure food security for all people as the numbers of refugees will continue to increase. The allocation of lands to refugees could also lead to land disputes as land registration is not conducted in a systematic and reliable way.

In summary, the following changes and effects on food security have been recognized from the key trends:

| Po | pulation growth | Climate change | Migration |
|----|-------------------------------|--------------------------------------|-------------------------------|
| • | Exponential population growth | Changing rain patterns | Increased land pressure |
| ٠ | Nutrition gap increasing | Common flooding and droughts | • Risk of land disputes |
| • | Distribution gap increasing | Acute food insecurity occurrence | • Increased population growth |

Table 9 – Changes and effects on food insecurity

2.3. National policies related to food security

What is the national policy and programme?

Having detailed the main determinants of the food security situation in Uganda, we move to describing the efforts being undertaken by the Government as well as by Development partners to improve the food security situation in the country. The Government of Uganda itself has implemented several policies and programmes related to food security. The most relevant policies are outlined below and include three types: (1) the long term strategies in the Vision 2040 and the National Development Plans; (2) the short term frameworks for agricultural development in the 5-year NDPs and the Ministry of Agriculture's Development Strategy and Investment Plan (DSIP); and (3) the policies and programmes focussed on nutritional improvements.

Before continuing to discuss the policies it is important to note that funds are limited. Even though the budget allocation for agriculture by the Government of Uganda marginally increased between 2007 and 2013, actual spending on agriculture by the Government of Uganda declined by 15% in this period. Furthermore, only 3-4% of total government spending is used for agriculture, while a level of 10% has been recommended by the relevant authorities. With an increase in the national budget allocation of 109%, it is clear that the agricultural sector is underfunded.⁶¹ Part of the MAAIF's budget is used to promote commercialization. More extensive input packages were provided to farmers through the National Agricultural Advisory Services (NAADS).⁶² While the NAADS mainly provide technical extension services and training, free inputs such as seeds, fertilizers and small livestock are still provided. These services are provided to farmers participating in the NAADS

⁵⁹ FEWS NET. (2016). Food Security Outlook Uganda June-September 2016. February 2016. Retrieved from:

http://popstats.unhcr.org/en/persons_of_concern at 28-09-2016

http://www.fews.net/east-africa/uganda/food-security-outlook/february-2016

⁶⁰ UNHCR statistics, Persons of concern in 2015 in Uganda, retrieved from:

⁶¹ FAO. (2014). Analysis of public expenditure in support of food and agriculture in Uganda, 2006/07–2012/13.

⁶² Sergiy Zorya, Varun Kshirsagar, Madhur Gautam, Willy Odwongo, Jos Verbeek, and Rachel Sebudde (2010). Inclusive Growth Policy Note - Agriculture for Inclusive Growth in Uganda.

programme and do not always reach the poorer farmers nor necessarily lead to higher uptake of new technologies. 63

2.3.1. Vision 2040 (2013)

Vision 2040 is Uganda's long-term development strategy aimed at continuing progress in addressing Uganda's strategic bottlenecks since independence, including ideological disorientation, weak private sector, underdeveloped human resources, inadequate infrastructure, small market, lack of industrialization, underdeveloped services sector, under-development of agriculture, and poor democracy⁶⁴. With Vision 2040, the Government of Uganda hopes to transform Uganda from a predominantly peasant and low income country into a modern and competitive upper middle income country (in 30 years). To achieve this long-term goal, Uganda aims to strengthen infrastructure, innovation, land use and management, human resources and security. Vision 2040 consolidates the Comprehensive National Development Framework adopted in 2007, including three 10-year plans; six 5-year National Development Plans (NDPs); and Sector Investment Plans (SIPs).

2.3.2. National Development Plan (NDP) 2010/11 – 2014/15

The National Development Plan supports Uganda's long-term vision of transforming Uganda into a modern prosperous country in 30 years (Republic of Uganda, 2013⁶⁵). Therefore, the theme of the 2010/11-2014/15 NDP is "growth, employment and socio-economic transformation for prosperity". The NDP sets objectives for all sectors including enhancing employment; improving economic infrastructure; and promoting sustainable population and the use of environmental and natural resources. With regard to food security, the NDP has formed several strategies towards improving agricultural productivity, such as increasing supply of water for agricultural activities, accelerating the development of selected strategic commodities (coffee, maize, fish, beef, dairy, poultry, beans, bananas and cassava) and increasing public private partnerships (PPPs) in value chains in the agricultural sector with emphasis on strategic commodities. In addition, another strategy is focused on increasing "ability of households to earn and allocate higher incomes to meet national nutrition and food security standards, and to demand appropriate sources of clean energy while conserving water and soils" (Republic of Uganda, 2013: 202). The second five-year National Development Plan (2015/16-2019/20) has been published in March 2015.

2.3.3. Agriculture Sector Development Strategy and Investment Plan (DSIP) 2010/11 – 2014/15

The Agriculture Sector Development Strategy and Investment Plan 2010/11 - 2014/15 is the strategy of the Ministry of Agriculture, Animal industry and Fisheries (MAAIF) and defines the agricultural sector development agenda for five years (MAAIF, 2010^{66}). The DSIP builds on the Plan for Modernization of Agriculture (2001-2009) and is in line with the agricultural priorities and strategic objective of the NDP. DSIP addresses constraints in the agricultural sector by means of four strategic investment programmes: increasing agricultural production and productivity, increasing access to markets and value addition, creating an enabling environment for the private sector in agriculture and strengthening agricultural institutions at the centre and in local governments (MAAIF, 2010: i). "The total cost of the "ideal" five-year programme is UGX 2,731 billion with first year costs starting at UGX 457.9 billion" (MAAIF, 2010: 93). The majority of the funds is allocated to the production and productivity programme (69 percent). The market access and value addition programme will take 25 percent, the creating an enabling environment programme 4.2 percent and the institutional strengthening programme 2.2 percent. Another specific programme strategy is improving the collection of food

⁶³ Okoboi, Geofrey, Annete Kuteesa, Mildred Barungi (2013). The Impact of the National Agricultural Advisory Services Program on Household Production and Welfare in Uganda. Africa Growth Initiative.

⁶⁴ Republic of Uganda. (2013) Uganda 2040. Retrieved from: http://npa.ug/wp-

content/themes/npatheme/documents/vision2040.pdf

⁶⁵ Republic of Uganda. (2010). National Development

 $[\]label{eq:linear} Plan\ 2010/11-2014/15. Retrieved from:\ http://www.adaptation-undp.org/sites/default/files/downloads/uganda-national_development_plan.pdf$

⁶⁶ Ministry of Agriculture, Animal Industry & Fishery. (2010). Agriculture for food and income security. Agriculture development strategy and investment plan: 2010/11 – 2014/15. *Republic of Uganda*. Retrieved from:

http://agriculture.go.ug/userfiles/Agricultural%20Sector%20Development%20Strategy%20and%20Investment%20Plan(2).pdf

and agricultural statistics, for example by setting up a national food and agricultural statistics system and databank. The programme expects to reduce rural poverty and the prevalence of stunted children under five.

2.3.4. Uganda Food and Nutrition Policy (UFP) (2003) and Food and Nutrition Strategy (2004)

The Uganda Food and Nutrition Policy sets the objectives and strategies to achieve the overall goal of "food security and nutritional adequacy for all people in Uganda, for their health as well as their social and economic well-being" (Republic of Uganda, 2003: 4⁶⁷). The UFP has been formulated within the context of Uganda's Poverty Eradication Action Plan as the two are closely connected. Poverty is one of the main determinants of malnutrition, and poverty and malnutrition often combine into a vicious circle. Additionally, the UFP is guided by the principles of the human right to adequate food and nutrition and the GoU's obligation. The policy is broad and includes the main areas of food processing and preservation; external food trade; food aid; food standards and quality control; gender food and nutrition. The government has planned to realize the UFP goals by creating a mechanism to efficiently manage the food chains and build capacity at all levels. For example, the Uganda Food and Nutrition Council was established to coordinate food and nutrition programmes at the national level. Furthermore, food education programmes and a national food and nutrition training centre have been set up.

2.3.5. Uganda Nutrition Action Plan (2011-2018) and Scaling Up Nutrition (SUN)

The Uganda Nutrition Action Plan (UNAP) addresses the nutritional needs of young children and women of reproductive age (15-49 years). This plan was adopted after Uganda had joined the Scaling Up Nutrition Movement (SUN), showing the country's commitment towards improving food security. UNAP is the strategic framework for scaling up nutrition. The UNAP's main target is reducing the prevalence of stunting and underweight amongst children (under five) with 6% by 2016 (stunting from 38% to 32% and underweight from 16% to 10%)⁶⁸. By improving women, maternal and child health, the Ugandan economy could benefit from an increase of about UGX 130 billion per year due to an increase in national economic productivity (Republic of Uganda, 2011: 15).

2.4. Programmes of the main other donors in Uganda

What are the programmes of the main other donors in the country?

Uganda receives support from various donors. In 2014 Uganda received a total net amount of Official Development Assistance (ODA) of US\$ 1,632.9 million (6.3% of Gross National Income). This consists of both bilateral aid and aid provided through multilateral organisations. This section briefly discusses the food security strategy and programmes of other donors in Uganda, positioning the foreign assistance within the country's food security and FS policy analysis in this chapter.

According to OECD (2014) statistics⁶⁹, the contributions to the agricultural sector in Uganda (comprising funding benefiting food security) totals US\$ 203,758 million. This is an increase compared to our baseline data from 2012, when US\$138.6 million was contributed to the agricultural sector. The top donors to Uganda in the agricultural sector are displayed in Figure 19. This also shows, compared to our baseline report, the position of the Netherlands has dropped from the second largest bilateral donor in the Agricultural sector to the eight largest bilateral donor (decrease in aid of US\$ 41,998 million between 2012 and 2014).

⁶⁷ Republic of Uganda. (2003). Uganda Food and Nutrition Policy. Retrieved from:

https://extranet.who.int/nutrition/gina/sites/default/files/UGA%202003%20The%20Uganda%20Food%20and%20Nutrition%20Policy.pdf

⁶⁸ Scaling Up Nutrition. (2015). Uganda. Retrieved 12 July 2016 from: http://scalingupnutrition.org/wp-

content/uploads/2015/10/SUN_Report2015_EN_Uganda1.pdf

⁶⁹ OECD statistics. (2016). Code: 311. III 1a. Agriculture Total. Retrieved from:

http://stats.oecd.org/Index.aspx?datasetcode=CRS1



Figure 19 - Main ODA donors for agriculture in Uganda (OECD, 2014)

It is important to note in this regard that in 2012 several (European) donors, such as the United Kingdom, have cut/suspended aid to the Ugandan government as a result of corruption investigations concerning Uganda's prime minister⁷⁰. Additionally, in 2014 international aid⁷¹ to the Ugandan government was suspended after the adoption of an anti-gay law, support was no longer provided by directly funding the government⁷². Although the law was annulled a few months later (August 2014), several donors did not immediately reinstate their aid. For the Dutch support, however, this did not affect the Food security programme, only the Rule of Law programme⁷³. We detail the most prominent funders and programmes below, not necessarily in order of significance.

2.4.1. Denmark

The Danish International Development Agency (DANIDA) administrates all Danish bilateral development assistance. Danish support to Uganda is concentrated around three thematic areas: Growth, Good Governance, and Human Development. DANIDA has a programme supporting public sector agriculture in Uganda, which is the Public Sector Agricultural Support (PSAS) (2010-2014 budget DKK 5 million)⁷⁴. The PSAS objective to provide technical assistance and support the Ministry of Agriculture, Animal Industries and Fisheries (MAAIF) in its preparations to receive sector budget support and subsequently to support implementation of the agriculture Development Strategy and Investment Plan (DSIP). Additionally, DANIDA has implemented an agriculture-based social safety net programme to help the Northern population of Uganda rebuilding their lives after 20 years of civil war.

2.4.2. *Germany*

The Federal Ministry for Economic Cooperation and Development (BMZ), the German development aid agency, declared Uganda to be a priority country for development cooperation in 2007. Germany is one of the top ten donors to Uganda and allocated 119.5 million euros from 2013 to 2015.⁷⁵ German-Ugandan development cooperation focuses on three priority areas: water supply and sanitation; renewable energies and energy

⁷⁵ Federal Ministry for Economic Cooperation and Development. (2016). What we do. Uganda. Retrieved 14 July 2016 from: http://www.bmz.de/en/what_we_do/countries_regions/subsahara/uganda/index.html

⁷⁰ BBC. (2012). UK cuts aid to Ugandan government. 16 November 2012. Retrieved from: http://www.bbc.com/news/uk-20368182

⁷¹ This was done by the mayor bilateral donors including the Netherlands, Norway, Denmark, UK, US, and Sweden.

⁷² BBC. (2014). Uganda court annuls anti-homosexuality law. 10 November 2014. Retrieved from: http://www.bbc.com/news/world-africa-28605400

⁷³ Dutch support (aid) to the Justice Law and Order sector was suspended, not food security aid.

⁷⁴ DANIDA. (2016). Úganda. Agriculture. Retrieved 13 July 2016 from: http://uganda.um.dk/en/danida-en/agriculture/

efficiency; and agricultural financing. Development cooperation activities focus especially on the most poor, Northern region of Uganda. For example, providers of financial services are helped to develop financial products for agricultural financing. Additionally, Germany supports the special fund "ONE WORLD – No Hunger" that is used for projects regarding land policy and sustainable fishery.

2.4.3. United Kingdom

The United Kingdom is the second largest bilateral development donor to Uganda and provides aid through the Department for International Development (DFID)⁷⁶. DFID funds many organisations to address the top priorities of: improving the quality of essential services and protecting the most vulnerable; increasing growth through investment in infrastructure, financial services, business development and trade; supporting recovery in the North; improving maternal health and government accountability⁷⁷. Food security is thus not at the forefront for the UK. Nevertheless, Poverty, Hunger and Vulnerability constitutes one strategic pillar of attention, including projects such as food/cash for work programmes in the Karamoja region.

2.4.4. United States of America

The United States is in general the largest (gross ODA) donor to Uganda (US\$ 465.9 million 2013-2014)78. USAID aims to reduce food insecurity and increase household incomes in Uganda by various agricultural programmes. The organization is active on 36 project locations throughout Uganda. In line with Uganda's national policies, USAID efforts aim to transform the agricultural sector from subsistence farming into more commercial operations. The U.S. Government's global hunger and food security initiative "Feed the Future" (2009) focuses on Uganda. Through this programme, USAID investments focus on the three value chains (maize, coffee and beans) with the greatest market potential, nutritional benefits and income potential for farming households. "Coffee is the country's most important export crop, maize will contribute to greater food security, and beans complement the maize to improve nutrition" (USAID, 201679). With Feed the Future's help 512,282 farmers have increased their yields in maize, beans, and coffee on average by 66 percent (2011-2014). Feed the Future has two main objectives: inclusive agricultural sector growth and improved nutritional status (women and children) (Feed the Future, 2016⁸⁰). Another food assistance programme funded by USAID is Food for Peace (FFP), specifically helping food insecure people in the Karamoja region (FY 2015 contribution of US\$43.6 million)⁸¹. Furthermore, FANTA (Food and Nutrition Technical Assistance) is a five-year cooperative programme aimed at improving health and well-being of vulnerable groups⁸². FANTA supports the Ugandan government in achieving the Nutrition Action Plan 2011–2016, including implementing a national nutrition advocacy strategy.

2.4.5. World Bank (International Development Association)

The World Bank (WB) supports various projects and programmes in Uganda. The arm of the WB providing assistance to poor countries, the International Development Association (IDA), is the second-largest financier of development programmes in Uganda, but has drastically reduced its committed lending to Uganda, from US\$725 million in 2014 to US\$102 in 2016. Examples of supported programmes related to food security are: An innovative, integrated approach to enhance smallholder family nutrition (2013-2017 – US\$3.0 million); Uganda multi-sectoral food security and nutrition project (2015-2019 – US\$27.6 million) and the Uganda clean cooking supply chain expansion project (2016-N.A. – US\$2.2 million). The first two projects promote the cultivation and consumption of nutrient-rich crops to improve nutrition for vulnerable and poor smallholder households in project areas. The clean cooking project focuses on the adoption of cleaner and more efficient cooking technologies.

⁷⁹ USAID. (2016). Uganda Agriculture and Food Security. Retrieved 13 July 2016 from:

⁷⁶ DFID. (2014). Operational Plan 2011-2016 Uganda. Retrieved from:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/389293/Uganda.pdf

⁷⁷ United Kingdom Government. (2016). DFID Uganda. Retrieved 13 July 2016 from:

https://www.gov.uk/government/world/organisations/dfid-uganda

⁷⁸ OECD. (2016). ODA recipients: Uganda. Retrieved 13 July 2016 from:

 $https://public.Tableau.com/views/OECDDACAidataglancebyrecipient_new/Recipients?:embed=y\&:display_count=yes\&:showTabs=y\&:toolbar=no?\&:showVizHome=no?&:showVizHome=no?&:showVizHome=no?&:showVizHome=no?&:showVizHome=no.&:showVizHomV$

https://www.usaid.gov/uganda/agriculture-and-food-security

⁸⁰ Feed the Future. (2016). Progress. Retrieved 13 July 2016 from: https://feedthefuture.gov/progress

⁸¹ USAID. (2016). Food assistance Uganda. Retrieved 13 July 2016 from: https://www.usaid.gov/uganda/food-assistance

⁸² FANTA project. (2016). Uganda. Retrieved 13 July 2016 from: http://www.fantaproject.org/countries/uganda

2.4.6. International Fund for Agricultural Development (IFAD)

The International Fund for Agricultural Development (IFAD) has been active in Uganda to fight rural poverty for over 30 years. IFAD is still one of the largest multilateral donors, and since 1982 has contributed US\$385.7 million (in loans on highly concessional terms) to finance 16 programmes and projects with the objective of empowering poor people and improving food security in the country's rural areas⁸³. Investments focus on three strategic objectives: Supporting smallholder agriculture; integrating smallholders into markets, particularly the vegetable oil subsector; and expanding the rural population's access to financial services⁸⁴.For example, the IFAD ATAAS Programme finances agricultural research and provides agricultural advisory services to poor farmers. The Vegetable Oil Development Project supports the national production of vegetable oils to generate employment. Lastly, a Rural Financial Services Programme has recently been completed to improve rural access to finance. IFAD allocates about US\$ 130 million to programmes in Uganda from 2013 to 2018⁸⁵.

2.4.7. European Union

The majority of EU funding to Uganda is financed by the European Development Fund. From 2014 to 2020 \bigcirc 578 million is allocated with the objective of fostering sustainable development⁸⁶. The EU finances several food security programmes. "Farmers' Voice: Improving Food Security Governance in East Africa" (2012-2015 budget \bigcirc 1,266,170) aims to empower smallholders' participation in food security related policy processes in Kenya, Tanzania and Uganda⁸⁷. The project is funded by the European Commission and co-funded by Agriterra (Dutch Agri-agency). The African Forum for Agricultural Advisory Services (AFAAS) is funded by the EU for the period 2014-2018 (\bigcirc 5 million)⁸⁸. This body brings National Agricultural Extension and Advisory Services of 36 countries under one umbrella to enhance utilisation of improved knowledge and technologies by agricultural value chain actors. The Northern Uganda Agricultural Livelihoods Recovery programme (ALREP) (\bigcirc 20,000,000) and the Karamoja Livelihoods Programme (KALIP) (\bigcirc 15,000,000) are programmes that specifically help people affected by conflict in Northern Uganda. Both programmes started in 2009 and end in 2015.

2.4.8. African Development Bank (AfDB)

Finally, the African Development Bank (AfDB) is committed to contribute to poverty reduction and economic growth in African countries, and therefore finances several programmes in Uganda. A specific food security project is the Uganda Community Agricultural Infrastructure Improvement Programme (2007-2013 US\$ 83.3 million, AfDB: US\$ 45 million, IFAD US\$ 32 million; Government of Uganda US\$ 6.3 million)⁸⁹. This programme rehabilitated rural roads, constructed markets, and installed agro-processing equipment to improve rural communities' connections to the market. The Markets and Trade Improvement Project focuses on improving marketplace economic and social infrastructure, consequently inducing incremental production and marketing of agricultural commodities, enhancing the incomes of vendors, reducing post-harvest losses, increasing employment and customer satisfaction⁹⁰.

https://webapps.ifad.org/members/eb/108/docs/EB-2013-108-R-6.pdf

http://www.eeas.europa.eu/delegations/uganda/projects/list_of_projects/improving_food_security_en.htm

⁸⁸ European Commission. (2016). Projects The African Forum for Agricultural Advisory Services (AFAAS) (11/09/2014). Retrieved 14 July 2016 from:

⁸³ IFAD. (2016). IFAD in Uganda. 13 July 2016. Retrieved from:

http://operations.ifad.org/web/ifad/operations/country/home/tags/uganda

⁸⁴ Ibid 51.

⁸⁵ IFAD. (2013). Republic of Uganda. Country strategic opportunities programme. Retrieved from:

⁸⁶ European Commission. (2016). International cooperation and development. Uganda. Retrieved 14 July 2016 from: http://ec.europa.eu/europeaid/countries/uganda_en

⁸⁷ European Commission. (2016). Farmers' Voice: Improving Food Security Governance in East Africa (11/09/2014). Retrieved 14 July 2016 from:

http://www.eeas.europa.eu/delegations/uganda/projects/list_of_projects/african_forum_en.htm

⁸⁹ AfDB. (2016). Uganda Community Agricultural Infrastructure Improvement Programme. Retrieved 14 July 2016 from: http://www.afdb.org/en/news-and-events/article/uganda-community-agricultural-infrastructure-improvementprogramme-12146/

⁹⁰ AfDB. (2016). Bank approves second phase of Uganda markets and agricultural trade improvement program. Retrieved 14 July 2016 from: http://www.afdb.org/en/news-and-events/article/the-bank-group-approves-second-phase-of-uganda-markets-and-agricultural-trade-improvement-program-13846/

2.5. Summary

To summarize, this chapter discussed the food security situation in Uganda. Uganda faces a serious problem in terms of food insecurity and economic development as the country loses some US \$899 million (5% of GDP) annually due to the effects of malnutrition. Especially rural areas and the Northern region (particularly Karamoja) are the most food insecure. Poverty is the main determinant of the condition of food insecurity, and other important contributing factors are gender (female-headed households), distance from the markets and dependence on subsistence farming. Food insecurity trends and recent forecasts show a deteriorating situation, especially due to higher pressure on the food distribution due to population growth and due to climate related vulnerabilities (particularly in the Northern region). Therefore, both the national policies of the Government of Uganda and programmes of other donors prioritize food security. The government of Uganda focusses both on intensification of the sector and on addressing malnutrition. Some bilateral donors contribute to both the production and the consumption side. Most programmes target a diverse set of aspects, including water supply, nutrition, farming skills and financial services. Some of the donor programmes are active in the North eastern region while others centre around the high potential production areas. In general, the GoU and development partners both work towards Uganda's vision of transforming Uganda from a predominantly peasant and low income country into a modern and competitive upper middle income country, by emphasizing the potential of improving agricultural productivity.

3. Evaluation of the project portfolio

During the first half of 2016 the Food Security 2012-2015 programme in Uganda was evaluated. In this chapter we present the results. The chapter first introduces the evaluation questions as set by IOB in the ToR for the evaluation (section 3.1). Thereafter the evaluation approach is presented (section 3.2). In the subsequent sections (3.3 - 3.6)each of the four evaluation questions will be separately answered to determine programme effectiveness and food security effects. Finally, the sustainability of the food security programme 2012-2015 in Uganda (section 3.7) and the unplanned positive and negative effects (section 3.8) are discussed.

The conclusions of the portfolio evaluation are discussed in chapter 5.



Figure 20 – Triangulation of research methods

3.1. Description evaluation questions

There are four key evaluation questions, based on the questions as determined by IOB (in the ToR 2013) for the programme evaluation 2012-2015. Each of these questions has been specified in a number of sub questions (detailed version by IOB in Annex A).

- What is the composition and motivation of the Dutch food security country programme 2012-2015 (Section 3.3):
 - What is the link between the Dutch strategy and the (broader) analysis of food insecurity in the country?
 - What projects are part of the food security portfolio?
 - What is the synthesis of the followed impact pathways?
 - What instruments are used and what is the synergy in tackling food security?(Section 3.4):
 - What instruments and channels are used (central-decentral, bilateral, multilateral; government, NGO, private sector)?
 - What is the coherence and synergy of the Dutch food security programme?
- Costs and efficiency (Section 3.5):
 - How many direct and indirect beneficiaries have been reached?
 - o How does project expenditure compare to the number of beneficiaries?
 - What can be concluded on the value of effects per beneficiary, and about their cost-effectiveness?
- Effectiveness (Section 3.6):
 - o To what extent is the anticipated pathway followed / have results been achieved?
 - To what extent can changes be contributed to the project pathway, alternative pathways, or other factors?
 - o Up to what level and impact has the food security of targeted households improved?
 - What is the evidence that food insecure people have been reached, directly or indirectly? How have women benefited?

3.2. Approach portfolio evaluation

In order to answer the evaluation questions as set out by IOB several sources of data have been collected, as described in this section. A detailed analysis plan can also be found in Annex C.

The endline portfolio evaluation builds on the data collected in the baseline in April 2014 and the endline in July 2016. Between the baseline and endline phase a questionnaire was sent to the project implementers to fill in a self-evaluation on their progress and contribution to food security (see Annex D).

The end line phase is the last stage of the programme evaluation.⁹¹ As Figure 20 shows, the evaluation is based on the various forms of data collection and the triangulation of data. This evaluation is based on both desk research and primary data collected in Uganda. Desk research was conducted to examine new available project documentation and a more extensive analysis on the food security situation in Uganda. The project level desk-research included the mid-term reviews and the latest annual reports. End-line reports were not available for this evaluation because 8 out of 9 projects had not completed yet. Data collection for the end line phase for the qualitative programme evaluation consisted of two types of evaluations conducted in July 2016:

- a portfolio evaluation of 8 projects for a high level assessment;
- an in-depth qualitative evaluation of 3 of the projects.

Based on an initial analysis of project documents, during the end line field visit (24-30 July 2016) interviews were held with the representatives of the project implementers for the eight projects for evaluation A (Please see Annex D for the questions and results), the high level assessment. Evaluation B, an in-depth qualitative evaluation, included the following three projects:

- 23618 Agri-Skills 4 You;
- 23619 Intra-regional trade; and
- 25582 Financial inclusion DFCU.

For the in-depth evaluations project-sites were visited, interviews were conducted with project staff, local representatives and beneficiaries (see Annex D and E). For the project of Financial inclusion this was done through individual interviews. For the other two projects a total of three focus group discussions (FGDs) were held during the final field visit. For Agri-skills two FGDs were conducted with two different target groups, students and farmers. For Intra-regional trade we conducted one FGD. Each FGD included around 12 participants. The FGDs were aimed at gaining insight in the perspective of project beneficiaries and the impact of the projects on their situation.⁹² Figure 21 depicts the approach to the endline field visits.



Figure 21 – Steps of field visits

The detailed information gathered through these different qualitative research methods is used to evaluate the main research questions in the remainder of this chapter. While aBi-Trust was evaluated separate from the portfolio evaluation of the other 8 projects, we include findings where available.

3.3. Evaluation question 1: composition and motivation of the Dutch food security programme 2012-2015

The analysis for question 1 consists of a discussion of the rationale and design of the Dutch food security programme in Uganda. This also builds on the country context described in Chapter 2, which allows us to evaluate the fit of the Dutch programme in relation to the food security situation and the Ugandan strategies.

3.3.1. Overview & strategy EKN projects in food security portfolio

Motivation for the Dutch food security country programme 2012-2015. How do the MASPS relate to each other, and to policy of Dutch government?

EKN and Aid to Trade policy

In 2011 a large revision of the Dutch development policy was initiated, focusing on fewer partner countries and fewer areas of cooperation. In this attempt Uganda was identified as a country listed at the profile-1 country list

⁹¹ The detailed Analysis Plan can be found in Annex B

⁹² The FGDs were prepared and conducted by evaluators from the Netherlands with colleagues from Uganda. The detailed approach to the FGDs is provided in Annex G.

of the Netherlands⁹³. This meant that Uganda still remained a valuable partner in de development cooperation and that the Netherlands were still willing to assist Uganda in her development, for example through the SDGs. Then in 2013 a new policy was published by minister Ploumen in which Uganda still remained a valuable partner to the Netherlands. However this partnership was now marked as "transitional" this referred to the transition from aid to trade⁹⁴. In the view of MFA this would lead to a phase out of traditional aid relations and instead build on trade relations, the pace of this would differ per country and there would still be room for poverty reduction. In each country the focal points of the Dutch development policy (security & rule of law, food security, water and SRHR) would still receive sufficient attention and the change would be gradual.

For Uganda this meant more focus on the private sector and also more focus on establishing trade relations with the Netherlands. This was one of the reasons food security was seen as a fruitful focus for Uganda, the agricultural industry provided many opportunities for collaborating with Dutch expertise on this field as well as for building trade relations⁹⁵. This is also an important development for the formation of the food security project portfolio of EKN. However, the main aim of this research is to determine whether the projects have contributed to the impact as foreseen within the food security policy of the Ministry. In this policy, as published in 2014 three main goals of food security interventions are mentioned: (1) elimination of current hunger and malnutrition, (2) promotion of inclusive and sustainable growth of the agricultural sector, and (3) realization of ecological sustainable food systems (see for more details Annex H).

These two angles of policy are both valuable, however they do not always easily combine in practice. Especially projects that are aimed at creating a better business climate and stimulating the private sector mostly affect the Ugandan people who already have a business and access to reasonable quality and quantity of food. The goal of eliminating hunger and malnutrition is often combined with more structural causes for example the regional distribution of food, as in Uganda the northeast is less well served. These are not the challenges that businesses focus new trade relations on; usually they start in areas where demand is sufficiently mature to meet their demands so they can build a steady business case. This means both policy angles may focus on different target groups in Uganda.

Composition of the Dutch food security programme 2012-2015

The portfolio consists of 9 projects. Table 10 below provides an overview of the project portfolio of the Dutch Food Security Programme 2012-2015 in Uganda.

| Project number | Project name | Abbreviation | Implementing organisation | Description of project |
|-------------------|--|----------------------------|--|--|
| 23473 | Operationalisation Development Strategy Investment Plan | Operationalization DSIP | World Bank | Operationalization of the MAAIF's policy framework, resulting into 13 action plans. |
| 23614 | KAM Support Fund Food Security | KAM Support | Various, including: NABC and Agriterra | Support of short-term and additional projects directly by EKN |
| 23615 | Support to aBi-Trust for Dairy | aBi-Trust | agriBusiness Initiative Trust (aBi- Trust) | Provide cooler systems to milk cooperatives and milk production skill development to farmers. |
| 23616 | KAM-CATALIST UGANDA | CATALIST | IFDC | Sustainable commercialization of smallholder agriculture. |
| 23617 | KAM integrated Seed Sector Development in Uganda | ISSD | Wageningen UR Centre for Development Innovation (WUR- | Stimulate the Ugandan seed sector and access to affordable quality seed by establishing functional seed |

⁹³ Focusbrief Ontwikkelingssamenwerking, 18 March 2011

https://www.rijksoverheid.nl/documenten/kamerstukken/2011/03/18/aan biedings brief-focus brief-ontwikkelings samen werking

⁹⁴ A world to gain: A new agenda for aid, trade and investment, April 2013

⁹⁵ MASP 2012-2015, p. 13

| | | | CDI) | business and creating a supportive public sector. |
|-------|--|---------------------|--|--|
| 23618 | KAM-Agri-skills 4 you | Agri-skills | ICCO Regional office Central & Eastern & Africa | Increasing income and improving food security by offering Business, Technical, Education and Training. |
| 23619 | KAM support to TradeMark East Africa - Uganda program | Intraregional Trade | Trade Mark East Africa | Increasing market access by removing trade bottlenecks at border posts. |
| 23620 | PASIC - Policy Action for Sustainable Intensification of Cropping Systems | PASIC | International Institute of Tropical Agriculture (IITA) | Create intensification of the agricultural production through research as well as by strengthening the capacities of institutions. |
| 25882 | KAM Financial Inclusion | Financial Inclusion | DFCU/Rabo Development | Improving livelihoods of the rural population by improving access to financial services. |

Table 10 – Project portfolio Food Security Programme Uganda 2012-2015

The Multi Annual Strategic Plans (MASPs)

The Dutch relation with Uganda is aimed at sustaining a transition from an aid to a trade relation. Uganda is one of the 15 partner countries and MFA considers the relationship transitional. The relations between Uganda and the Netherlands are organised on two levels. First, the Dutch policy is focused in a regional approach for the Great Lakes. The regional multi annual strategic plan for the Great Lakes Region forms the basis for the bilateral multi annual strategic plans, where the regional agenda is translated into bilateral action.⁹⁶ Food and agriculture are important aspects of the regional MASP. The three main outcomes of this regional MASP are: (1) Vulnerable groups' access to nutrition and work; (2) Farmers' production and income; (3) Business development, FDI and enabling environment.

Second, the Dutch policy on food security is envisioned in direct bilateral relations. This focus from EKN is summarised in the two Multi Annual Strategic Plans (MASPs) for Uganda, covering the period 2012-2015 and 2014-2017 respectively⁹⁷. Both documents focus on the two themes of Security and Rule of Law and Food Security. The Food Security Programme in Uganda was first introduced in 2012, in the MASP 2012-2015. The choice to commence the programme was made because the agricultural sector was seen as having great potential to increase economic development as well as improving human development in terms of food security. The focus on the economic potential of working on food security remains central in both MASPs and was also evidently present in our discussions with EKN staff members. Even though the Dutch policy is in line with the GoU policy, it does not reflect all elements of the Ugandan policy, as can also be seen from the MASP 2012-2015 that states that EKN will contribute to the GoU outcomes of: "Rural incomes and livelihoods increased; and household food and nutrition security improved". The objective of nutrition security is however explicitly not targeted directly with the programme, neither in the MASP 2012-2015 nor the MASP 2014-2017. Instead the main focus is on the increase of incomes and production.

The goal as formulated in the MASP 2014-2017 clearly describes the development pathway envisioned by the EKN: The goal of the food security programme is "inclusive growth of farm incomes and agro-food production by market-oriented small farmers, in particular women and youth, thereby contributing to sustainable individual food access" (Embassy of the Kingdom of the Netherlands in Uganda, 2014: 15). This approach is visualized in the MASP Uganda 2014-2017, which includes a specific intervention logic regarding food security (see Figure 22). Such a visualisation was absent from the MASP 2012-2015. As can be seen in the intervention logic, economic cooperation is introduced as a separate theme besides food security, underlining Dutch efforts

⁹⁶ The Great Lakes region comprises Burundi, Democratic Republic of Congo, Kenya, Rwanda, Tanzania and Uganda.
⁹⁷ Embassy of the Kingdom of the Netherlands in Uganda. (2012). Food & Justice. Investing in human security in a challenging governance context. Multi-annual strategic plan 2012-2015.

Embassy of the Kingdom of the Netherlands Kampala. (2014). Multi-annual strategic plan 2014-2017. Capitalising on proven strength.

to shift from an aid to a trade relationship. Agro-food is identified as one of the top sectors for facilitating Dutch investments and trade. Synergy is thus created between economic cooperation and food security in order to, eventually, increase sustainable individual food access. These two topics are therefore the main two outcome areas in the intervention logic. We have added the project numbers in Figure 22 to show the pathways these projects follow within the intervention logic. Each project is positioned at the outputs to which it was intended to contribute. From this first exercise we can already make several observations regarding the project portfolio:

- None of the projects cover 'Land rights secured' and '(Agri) Logistics expansion/water'. This can be explained by the fact that these outputs were only added to the EKN programme at a later stage.
- Not all projects follow the exact pathway as designed in the intervention methodology. For example in the project documents of Financial inclusion attention is paid to increasing access to financial services (output 2.2), yet no mention is made of the effect on the effectiveness of agri-processing (output 2.6). However that effect is mapped in the intervention logic.

As can be seen from the intervention logic the food security outcomes have been made more specific in the MASP 2014-2017. The intervention logic contains most of the important aspects for the EKN strategy to food security and shows their interrelation. We will make some initial observations on the design of the intervention logic:

- The outcome 'HH food purchasing power' should also be linked to 'HH farm income increased'. 'Economic cooperation strengthened' only indirectly leads to 'HH food purchasing power' through increased income and would better fit on the level of 'More Dutch investment and trade', and another outcome could then be placed on the level of 'HH farm income' and 'HH non-farm income', such as 'employment increased'.
- Secondly, and more fundamentally, the bottom outcome 3.1 aggregates the entirety of policy enabling projects in one box. Given the importance of the balance and synergy between projects aimed at direct beneficiaries and projects that contribute to an enabling environment, the intervention logic does not do much justice to the diversity of policy enabling conditions. Disentangling some of these enabling aspects might create more complexity in the model, but given its significance in the strategic vision, would make sense. Based on the evaluation of the contribution of the projects to food security and the followed pathways the intervention logic will be further reflected on.

The food security programme integrates cross-cutting issues of the Dutch policy. This means interventions targeting (rural) women and youth are prioritised, especially regarding skills development and employment creation. Results in the theme of food security were also to be gender-disaggregated. IOB's Terms of Reference affirm the need to consider the extent to which women have been targeted. Furthermore, comparing the MASP 2014-2017 and the MASP 2012-2015 there are several new topics included (see Annex H for the comparison between the MASPS). The outputs 'Land rights secured' and '(Agri) Logistics expansion/water' have been added, as seen in the intervention logic. Additionally, the MASP 2014-2017 pays attention to agro-economic diplomacy, sexual and reproductive health and rights and climate change. With the introduced focus on economic diplomacy, EKN aims to increase economic cooperation and opportunities for Dutch trade and investments. For example, the embassy facilitates a market scan and missions to either Uganda or the Netherlands to exchange knowledge and increase cooperation. Lastly, the new food security programme not only focuses on sustainability but also on climate adaptation (resilience) to mitigate the effects of natural, economic or political shocks.



Figure 22 – Intervention Logic EKN Kampala MASP 2014-2017

Green boxes are existing core areas of EKN's 2012-2015 programme; the white boxes 2.3 and 2.8 are areas that are part of the newly added in the 2014-2017 MASP but not yet included in the portfolio.

Table 11 shows the project duration compared to the scope of the MASP 2012-2015. As can be seen, only two of the nine projects have been finalised by 2015, the final year of the evaluation period, which covers the MASP 2012-2015. The other six projects continue in the MASP 2014-2017 period, and in one case, until 2018.

| Project no. | Project title98 | | | MASP | period | | | | |
|----------------|-------------------------------|------|------|------|--------|------|--------|------|------|
| | | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| 23473 | Operationalization DSIP | | | | | | | | |
| 23614 | KAM support fund | | | | | | Extens | sion | |
| 23615 | aBi-Trust project | | | | | | | | |
| 23616 | CATALIST-Uganda | | | | | | | | |
| 23617 | ISSD-Uganda | | | | | | | | |
| 23618 | Agri-Skills 4 you | | | | | | | | |
| 23619 | Intra-regional trade | | | | | | | | |
| 23620 | Agri-policy action | | | | | | | | |
| 25582 | Financial inclusion – DFCU | | | | | | | | |

Table 11 – Project duration compared to MASP 2012-2015 period

3.3.2. Link between Dutch strategy and broader analysis food security Uganda

3.3.2.1. Level of alignment with the Ugandan food security situation

What is the link between the Dutch strategy and the (broader) analysis of food insecurity in the country?

The Dutch food security intervention logic in Uganda covers several of the food security issues as identified in Chapter 2. The Embassy has explicitly stated to make choices for the (new) strategy and implementation modalities based on the Ugandan context, both in terms of regional (Great Lakes region) and national food security as well as related government policies.

Regional focus

First, as can be seen on the country map in Annex J all projects except for aBi-Trust (and the projects with policy activities) target farmers and rural households in Northern Uganda, where our country analysis has shown food insecurity to be highest. However, none of the projects target the most food insecure region of Uganda, the North-East (Karamoja). Five projects have activities in the South-West, which is a rural area and therefore relatively food insecure. Only two projects are active in the Eastern part (ISSD and Intra regional trade), which is the second most food insecure region. The common denominator in the targeted regions is that they are rural, with much subsistence farming and high potential for intensification. While from a pure food security perspective activities might have been distributed differently across the country, based on the target group and dual food security-economic development objective of EKN the actual geographical distribution makes sense.

Most vulnerable groups

Additionally, the programme generally addresses poverty as key cause of food insecurity by funding projects that aim to increase household income. This income increase is however not specifically aimed at the food insecure in project documentation. Investing in programmes increasing agricultural

⁹⁸ The project numbers and titles are used to refer to the relevant projects here, to ensure readability of the Table. For more information about their implementers and the intervention strategy, please refer to Annex I.

productivity has a large impact on farmer income, household food security and economic development. Therefore, the EKN projects aBi-Trust, CATALIST Uganda, and ISSD-Uganda focus on improving agricultural productivity and CATALIST as well as Agri Skills specifically adopt a strategy of improving farmer integration into the value chain, which also addresses the recognized bottleneck of difficult access to markets. This aspects is further addressed by the infrastructure projects, particularly CATALIST aims to enhance ease in distribution, which is a problem for rural areas. The programme also pays special attention to women as a target group, however this has been integrated in the programme over time. There is also no specific targeting on female-headed households, which were found to be generally more vulnerable than male-headed households in our analysis in section 2.2.1.2.

Climate change

Climate change is another important trend affecting food security. While there is some attention for climate aspects in the programme and the different projects, the topic appears to be not very prominent, and concrete expressions of climate awareness appear to be limited. Climate change has been explicitly taken into consideration by EKN in the MASPs and EKN undertakes activities to incorporate climate elements into agri-projects. The farm-level projects also include climate resilient approaches, such as fertilizer use, seed varieties and crop diversification, to ensure farmers can better cope with unpredictable seasons (see section 3.7 on sustainability).

Policy making

Furthermore, a few projects are explicitly focussing on strengthening the government of Uganda. As briefly described in section 2.3, the institutional environment of the agricultural sector in Uganda is underdeveloped, lacking financial and human resources for effective implementation. The food security projects Operationalization DSIP and Agri-policy action aim at improving the regulatory framework regarding the Ugandan agricultural sector, thereby intending to improve top-down support to increase food security. The strengthening of local institutions in this regard is not a priority for EKN, while they also lack capabilities and resources. However, whereas child stunting and malnutrition is still one of the key problems in Uganda (see section 2.2), none of the projects are focused on this issue. Additionally, the problem of population growth has not been addressed, whilst this is increasingly pressing on the food security of the country, as described in the country analysis. Including sexual and reproductive health rights in the food security projects, such as improving awareness on sexual and reproductive health rights and knowledge on nutrition for pregnant women and children, is done by only one project (Agri Skills). The programme does address the increasing food gap by focusing on intensification and production increase. Also, the food security projects tend to focus on increased food availability (quantity) whilst ignoring the aspects of food utilization and consumption (diversity and quality of food). Yet, this has been an explicit choice by EKN as mentioned in the MASP 2012-2015 "as this would require a multidisciplinary approach including interventions in the health and water sector, sectors that can already count on the support of many other Development Partners and Civil Society Organisations"99.

3.3.2.2. Level of alignment with the policy of the Government of Uganda

The Dutch strategy regarding food security shows a strong link with the policy of the GoU. This includes Uganda's development goal of achieving a middle income status by 2040 and transforming the agricultural sector from traditional to modern and competitive, as was also explained in paragraph 3.3.1.

As mentioned in 3.3.1, the MASP 2012-2015 and MASP 2014-2017 are aligned with the outcomes and outputs as set by the GoU in the DSIP. The outputs of EKN align particularly well with the following outputs set by the Government of Uganda:

- 1. Factor productivity (land, labour, capital) in crops, livestock, and fisheries sustainably enhanced.
- 2. Markets for primary and secondary agricultural products within Uganda, the region and beyond, developed and sustained.

⁹⁹ EKN, MASP 2012-2015: p. 13.

3. Favourable legal, policy and institutional frameworks that facilitate private sector expansion and increased profitability along the entire value chain developed.

All EKN 2012-2015 outputs¹⁰⁰ (1, 2, and 3) feed into DSIP outputs 1 and 2. EKN outputs 2 and 3 feed into DSIP output 3 (Embassy of the Kingdom of the Netherlands in Uganda, 2012: 17). Similarly, the MASP 2014-2017 is also aligned with the DSIP (EKN Kampala, 2014: 4). EKN also supports the National Development Plan and its aims to increase economic growth and rapid job creation by means of, for instance, improving transport infrastructure and supply of energy (Embassy of the Kingdom of the Netherlands in Uganda, 2012: 8). The intra-regional trade project provides an example of this EKN support. This project involves activities that stimulate intra-regional trade and improving of competitiveness by reducing transport costs. However, the focus on job creation is only moderately present in EKN's strategy.

Moreover, the GoU lacks sufficient resources and is not able to provide sufficient policy support to the agricultural sector and actors. The Food Security Programme is specifically aligned with the Development Strategy and Investment Plan (DSIP). EKN recognizes the DSIP as a useful basis to achieve a transformation of the agricultural sector. EKN assists the GoU in building capacity and tools through the project Operationalisation DSIP. Additionally, EKN promotes good governance by supporting the implementation of critical functions of the Ministry of Agriculture Animal Industry and Fisheries (MAAIF). This includes EKN's efforts through the project of Agri-policy action. EKN's strategy is not aligned with the noted objective in the DSIP to strengthen local governments.

However, the EKN Food Security programme does not demonstrate a clear link with Uganda's Food and nutrition policy/strategy and the Uganda Nutrition Action Plan. In relation to food security, and through these programmes, the Government of Uganda is active on improving the household level food intake. Part of this are the Uganda Food and Nutrition Council, which coordinates food and nutrition programmes at the national level, and a national food and nutrition training centre. Under the Ugandan Nutrition Action Plan the government of Uganda aims to reduce the prevalence of stunting and underweight amongst children (under five) and improving women, maternal and child health. Additionally, the Health Sector Strategic Plan III (2010-2015) also focuses on nutritional intake. It is clear that for the Government of Uganda direct food security at the individual level is prominent. The EKN has chosen not to include projects directed at food and nutrition intake level, but to focus on production, trade and income at the farm level.¹⁰¹ It is presumed that increased access will automatically translate into improved intake. EKN noted that they have deliberately not included nutritional intake in their food security strategy to maintain sufficient focus and because other Dutch and international organisations (e.g. UNICEF) undertake extensive programs on nutrition. There is too little information available to determine if potential benefits of increased food security have been missed out due to lack of alignment. EKN staff noted that they did plan to include a focus on nutrition in the follow up food security program. This is understandable as there is significant space for synergies with stakeholders.

Moreover, the National Development Plan stresses the potential for Private-Public Partnerships (PPP) in value chains in the agricultural sector. The EKN's MASP also makes notice of this in the description of the key outputs, noting "There will be increasing use of PPPs with Dutch 'shining diamonds'".¹⁰² On the other hand EKN appeared less supportive of a strategy in which cooperation with the government institutions would be extensive, and primarily focused on the private sector. Several other topics that are high on the agenda of the GoU for agricultural development, including land rights, energy and water, have been stressed by EKN as well but were not part of the food security programme so far. These will however be prominent in the next phase of the FS programme. The same goes for support

¹⁰⁰ 1. Improved performance of selected agro-food value chains and actors. 2. Enabling environment is conducive for agribusiness in general and the selected agro-food value chains (Irish potatoes, rice, cassava, dairy and seed).
3. Dutch trade and investment promotion in the area of food security is enhanced.

¹⁰¹ EKN MASP 2012-2015: p.13.

¹⁰² EKN MASP 2012-2015: p.10.

to other agro-chain actors including processors, which are also targeted by DSIP in the objective for more value addition, and will become more central for EKN's strategy.

3.4. Evaluation question 2: What instruments are used and what is the synergy in tackling food insecurity?

This section provides an assessment of the internal coherence of the portfolio and its relation to other initiatives targeting food security. The country programme consists of different pathways, channels and instruments. Therefore, key characteristics of the internal composition of the portfolio are assessed. Then the internal synergies between the portfolio projects are assessed. Thereafter the programme's relation to other programs and stakeholders is analysed.

3.4.1. Instruments and channels

What instruments and channels are used (central-decentral, bilateral, multilateral, government, NGO, private sector)?

The EKN food security programme shows a broad variety of projects and project implementers. Table 12 shows the different channels through which the food security programme is implemented.

| Multilateral3Operationalization of DSIP, KAM Support Fund, Intraregional TradeNGO2Agri-skills, CATALISTPrivate sector1Financial Inclusion | Channel types | Number of projects | Projects |
|--|------------------------|-----------------------|--|
| NGO2Agri-skills, CATALISTPrivate sector1Financial Inclusion | Multilateral | 3 | Operationalization of DSIP, KAM Support Fund, Intraregional Trade |
| Private sector 1 Financial Inclusion | NGO | 2 | Agri-skills, CATALIST |
| | Private sector | 1 | Financial Inclusion |
| Knowledge institutions2ISSD, PASIC | Knowledge institutions | 2 | ISSD, PASIC |

 Table 12 – Different channels of programme implementation

The majority of the projects are implemented by governmental and non-governmental development organisations. All projects are implemented as a grant instrument, the projects are subsidized and the contribution does not have to be reimbursed. An example of multilateral donor support can be found in the Operationalization of DSIP, in which the implementing organisation, the World Bank, is supported by EKN, the Danish government and USAID and by DfID providing central funds. Examples of NGO project implementers are the IFDC and ICCO, two international organisations, implementing the CATALIST and Agri Skills projects respectively. Financial Inclusion is the only project fully executed by the private sector, an initiative by the Dutch Rabobank and the Development Finance Company of Uganda Bank (DFCU) which aims to improve rural access to financial services. There are two projects implemented by knowledge institutions. ISSD is implemented by the Dutch Wageningen University, and PASIC by the International Institute of Tropical Agriculture. Many of the project implementers are local or international civil society organisations with a long presence in the region. This applies to CATALIST, Agri-skills and at a later stage by ISSD.

The nature of the channel in which the grant instrument is operationalised, also determines the type and intensity of the engagement as well as the influence of the Dutch sponsorship on the project. In the multilateral projects the contribution of the Dutch support will be less essential than for projects with little other financing, such as Agri-skills, PASIC and ISSD. The EKN has actively sought a diversity of instruments and channels.

3.4.2. Pathways and approaches

Based on this diversity of channels, the programme makes use of different pathways and methods, including government engagement, value chain integration, capacitating farmer groups and

production enhancement. These approaches focus on and interact with different levels of society (demonstrated in Figure 23).

Policy setting and engagement at several levels of governance are important methods in the programme. Most of the projects in the EKN portfolio work with the government of Uganda, through central and decentral government institutions. There are projects that target the central government, and most particularly the MAAIF. Examples of these projects are Operationalization of the DSIP and PASIC, which aim to strengthen the institutional framework in order to create a supportive and sustainable public sector that enables the agricultural sector. Also decentral governments are included in the food security programme in Uganda. Especially the ISSD project incorporated this level into the programme by training so-called District-Agricultural Officers (DAOs) on seed field inspection. 24 District Agricultural Officers (DAOs), who are linked to 24 districts, on seed field inspection. This resulted into numerous District Local Governments embracing and incorporating seed production activities in their work plans and budgets (2015 Annual Report, p. 27).

The approach of private sector engagement was included in a variety of projects. CATALIST, ISSD, Agri-skills and Kam Support Fund are projects that used private sector engagement. CATALIST aimed to increase access to finance by working together with a number of financial institutions and Agri-skills was focused on the promotion of entrepreneurship and the development of business skills, thereby encouraging more private sector engagement. KAM Support Fund organized a wide variety of different sub-projects, of which many include private sector engagement. Examples are the farmer and potato missions to the Netherlands, in which businesses in Netherlands met Uganda farmers, as well as the investment study that was executed in order to attract more private sector investment to Uganda.



Figure 23 – Different levels included in the intervention method and effects

At the farmer level, the food security programme was active in the formation of cooperatives or farmers groups. CATALIST partly focused on the promotion of formation of cooperative societies as well as the registration and legalization of farmer groups. This mostly happened by encouraging interactive meetings in order to help identify challenges that prevented associations from growing and being empowered. The formation and strengthening of farmer was also an important instrument in ISSD and Agri-skills.

Several projects are aimed at increasing production by diminishing barriers to resources. The instruments in the programme thus focus on the production side, and down to the farmer level. Agri-Skills 4 You, ISSD and CATALIST (and to some extend Financial Inclusion) aim at reaching the farmers, smallholders including women and youth. However, none of the projects focus on the consumer side of food security as defined also in the Theory of Change 2015. This would include projects aimed at food improvement/enrichment and also require more attention for their personal environment, for example quality of water, knowledge of food (quality), sanitation and sexual and reproductive health and rights¹⁰³. The latter is to some extend included by Agri-skills.

The relation between these levels are displayed in Figure 23. It shows that ultimately reaching the Ugandan (food insecure) population, can be accomplished directly or via intermediate levels as described above. The instruments mentioned above are furthermore augmented by infrastructure projects (in Intra-regional trade and CATALIST) and by research activities to strengthen the knowledge base (PASIC, Operationalisation DSIP). By combining these instruments and channels, EKN aims to improve food security in various ways and from several levels. Also some projects combine the different levels, for example ISSD is focused on both central government and farmers groups. Also Agri-skills is focused both on rural population and on district staff.

In Figure 23 two main groups of target groups are presented, intermediate reach and direct reach. A few projects focus only on intermediate reach (PASIC and DSIP). However most projects focus on a combination of both of these levels and thereby work with an inclusive approach. There are projects, including PASIC and ISSD, that established platforms which, through the collection and distribution of knowledge and information, aimed to facilitate in multi-stakeholder engagement, thereby connecting the direct reach with the indirect. However, the degree to which interest groups, local civic organizations, community leaders and other stakeholders were engaged throughout the project is for most projects limited. Bringing together these stakeholders can help to connect the farmer and community level activities with the institutional and governmental level. This might therefore deserve more attention in the programme.

3.4.3. Synergy between the MASP 2012-2015 projects

The internal programme synergies that were part of the strategy of EKN (as both the outputs and the intervention logic shows) consist of synergies between value-chain projects (direct reach, at farmer level) and enabling environment projects (intermediate reach) and synergies between the objectives of food security on the one hand and economic cooperation on the other. For clarity, we conceptually divide the projects into three categories: Value chain projects, Market enabling projects and Policy enabling projects. In this section the logic for this division for EKN and for this evaluation is discussed and the effectiveness of the synergies between the projects is considered.

The EKN has used a deliberate strategy of including in the programme both 'enabling environment projects' and 'value chain projects'. The MASP 2014-2017 (p. 15) notes that activities are clustered into two groups:

- 7. Agro-food value chains, with focus on agro-processing and strategic partnerships with Dutch business & know-how;
- 1. Agribusiness environment, with a focus on agro-finance, skills, agri-logistics and regulatory enforcement.

¹⁰³ Ministry of Foreign Affairs (2015). Theories of Change Speerpunten en Prioritaire Thema's: Voedsel – en Voedingszekerheid, narrative, pages 2-3

In the Terms of Reference IOB also explicitly refers to this distinction, stressing its importance, noting that 'for the broader policy evaluation and learning, the policy evaluation will focus on both core and peripheral food security activities, clearly indicating the separation between these two groups of activities'. In our findings this division also became apparent and we will use the division in order to meaningfully evaluate the projects according to their proper logic and role in the program. We define the projects as follows:

- Value-chain projects: These projects directly target the food insecure and apply instruments aimed at production enhancement and agro-chain integration.
- Enabling environment projects: Projects that contribute to a conducive market and policy environment for agricultural development, enabling thereby the value chain actors.

| Value chain projects | Market enabling projects | Policy enabling projects | | | |
|---|--------------------------|--------------------------|--|--|--|
| CATALIST Uganda | Trade Mark East Africa | DSIP | | | |
| ISSD | Agro-Finance | PASIC | | | |
| Agri-Skills 4 You | KAM Support Fund | | | | |
| aBi-Trust | | | | | |
| Table 13 – Food Security project categories | | | | | |

The following table categorizes the portfolio projects according to this logic.

The intention of EKN in combining these different types of projects is that a transformation needs to be realized at all levels (shown in Figure 23) and that barriers to commercial intensified farming are addressed so that on a farmer and agri-business level efforts to enhance production and reduce food insecurity are more effective. In the view of EKN, when projects directly targeting the rural population and farming practice (engaged in value chains) cooperate with those projects that target market and institutional conditions, those will have the most potential of accomplishing large and durable improvements to the countries agricultural sector and food security situation.¹⁰⁴

This division also aligns with EKN's intervention logic and the synergies between economic cooperation and food security as outlined in the MASP 2014-2017. EKN is convinced that the food security improvements should be private sector led¹⁰⁵. By focusing on food security on the one hand and on economic development on the other hand, the projects are expected to strengthen one another. In practice this means that most value chain projects support the intervention logic for food security and the enabling environment projects support the intervention logic for economic development. However attempts at both topics are mainly in line with the second goal of the Dutch food security policy: 'promotion of inclusive and sustainable growth of the agricultural sector'. The other two goals of the food security policy as mention in paragraph 3.3.1 seem to be less explicitly addressed in the Ugandan projects¹⁰⁶. On the one hand this seems understandable, one cannot do everything in all countries. On the other hand it is remarkable that especially the first goal of fighting malnutrition receives so little attention, especially regarding the current state of Uganda. It must be noted that this integration of the two programmes does make it more difficult to determine the effectiveness of the project on food security alone, as some projects cross the two programmes.

3.4.4. Effectiveness of synergies

Within the programme, several projects were able to realize synergies through cooperation. However, the extent and intensity of the cooperation differed. As envisioned and stimulated by EKN, synergies were sought between all projects and mostly between direct implementing projects and enabling projects. There are some cases in which this synergy between projects is clearly visible. Other cases are recognized in which opportunities for synergies have been missed.

¹⁰⁴ Interview EKN, end line evaluation July 2016.

¹⁰⁵ *Ibid*.

¹⁰⁶ These were: 'elimination of current hunger and malnutrition' and 'realization of ecological sustainable food systems'.

3.4.4.1. KAM Support Fund

Through the KAM Support Fund annual and bi-annual meetings were organized which were used to share experiences as well as to explore possibilities for collaborations with the other portfolio projects, as well as other stakeholders. Through the KAM Support Fund EKN carried out a number of studies that benefited the projects and created linkage with Dutch Agri-Business. In the 'Best Farmer' competition set up by KAM Support Fund, The DFCU bank was one of the sponsors, which aligned with their role as implementer of Financial Inclusion.

3.4.4.2. PASIC & ISSD

PASIC cooperated with ISSD to set the agenda for better seed policy and to outlaw counterfeit seeds. Through their approach ISSD contributed by collecting the evidence through studies on integrated seed sector development. ISSD and PASIC build an effective alliance for seed policies together with other stakeholders. Their advice has become leading on this topic for relevant political institutions, and the policy is in the process of approval. As ISSD reported they have struggled with outreach and publicity for their efforts, and PASIC in the first years of the project struggled with impactful communication and strengthening ties with relevant government institutions, the synergy could have been more effective. The different districts in which they operated was also seen as a constraint by PASIC.

3.4.4.3. PASIC & CATALIST

Between PASIC and CATALIST, the cooperation consisted of studies for project-learning as well as shared efforts to influence bylaws of district governments. PASIC has done much research on intensification in rice and potato and their findings over the year 2015 have been used to inform the activities of CATALIST, including to support the implementation of a new product for intensification. PASIC worked together with the implementing partners of CATALIST, as well as with other stakeholders in consulting meetings, to recognize hurdles to intensification and to influence the district bylaws, also by informing district reports and plans. However, few concrete outcomes have been reported and PASIC was not able to demonstrate contribution.

3.4.4.4. Agro-Finance & CATALIST

Financial Inclusion considered their cooperation with CATALIST to be especially important. They have worked together on value chain studies of oilseeds in Northern Uganda. CATALIST already operated in this region and Financial Inclusion considered the studies an important basis to map the agri-sector markets that could benefit from their financial products. Within the agri-finance project and DFCU more broadly, there were competing views on the usefulness of the studies. No specific results have been recorded by DFCU as a result of the studies. On the other hand, Financial Inclusion made an effort to directly contribute to the enabling environment for farmers in the projects working with farmer groups. With CATALIST a small segment of farmer groups use the 'Safe for Loans' product. CATALIST noted that most farmers are not interested because of the high interest rates. Also, several farmer groups had defaulted on the loans because of yield setbacks. With aBi-Trust the product is offered to farmers against a subsidized interest rate. A similar cooperation with Agri-skills does not exist. This is remarkable as the projects operate in the same region in northern Uganda. Financial Inclusion however does work with several other NGOs, one of whom is also an implementing partner of Agri-skills. Financial Inclusion and ISSD had tried to cooperate but had found that the financial products were not a good match with the beneficiaries of ISSD. In the midterm review ISSD had explicitly been advised to work with partners providing financial services since this was a bottleneck. This was thus a missed chance.

3.4.4.5. ISSD & CATALIST

Some more loose collaborations have emerged, including between ISSD and CATALIST (as well as PASIC) in the development of Local Seed Businesses. This cooperation has been facilitated by the fact that both organisations operate from the same head office in Kampala. ISSD intended to work with other projects as well to distribute their seeds. While aBi-Trust was a potential partner, this was not

reported by ISSD. This is a reason for EKN to consider promoting sharing of office spaces in the upcoming food security program¹⁰⁷.

3.4.4.6. Conclusions

As these findings show, the projects that cooperated did in most cases follow the intended strategy, bringing enabling projects together with direct implementing projects. Some results have been achieved that might otherwise not have been achieved. Bringing together the hands-on experience of the project aimed at farmer practice with the policy and research orientation of the policy enabling projects has strengthened the effectiveness of individual projects. In the case of the provision of financial services cooperation is sought but effectiveness is so far moderate. At the time of the endline data collection, the project was ongoing, therefore we cannot draw final conclusions.

The staff from Intraregional trade noted that they had not cooperated with other projects. They did appreciate the interest shown of other projects' staff during EKN meetings. Operationalization DSIP too was not mentioned as a project for which cooperation with other projects was realized. This might have to do with timing, this project having finished at an early stage. However, it also appears that the multilateral projects, having more different and large donors, have a more autonomous project approach and target, reducing the need and ability to cooperate with other projects within the programme.

It is interesting to see that seeking synergies within the portfolio can have both positive and adverse effects. On the one hand the cooperation allows the effectiveness of the activities of one project to be tested in another project. This showed for example that the interest rates of financial products of one project were perceived by farmer groups in another project to be too high. With this feedback loop projects can help each other become more effective. On the other hand, synergies could create a risk of dependency. For example seeds produced in one project are distributed with financial support of another project instead of through the market as intended, an activity might not be fully functional without another project.

3.4.4.7. Synergies between the Dutch food security programme and activities of GoU and other donors

The programme and portfolio projects have been designed with the policies of the Government of Uganda in mind (as described in 3.3.2.2). Several projects worked with different levels of government institutions. However, because of the lack of resources and capacity, the government is not very active in implementing activities and programs to support the agricultural sector. When the MAAIF, district governments, or decentral agro-institutions were a relevant actors, in many cases the EKN and the project implementers have cooperated with them. The choice of EKN not to put too much emphasis on the policy framework was not because of the existing capacity of the MAAIF, but mainly because other organisation (including the World Bank) were already very active in this field.

EKN decided not to include pathways that focus on inclusive or participatory decision making, which could be another force through which relevant government authorities could be motivated to improve their policy action. The main reason for this is because they align with the government's view of making the sector market led. It is interesting to note that the European Union explicitly does have a program aimed at enabling farmers inclusion in policy making called "Farmer's Voice: Improving Food Security Governance in East Africa" (cf. section 2.4). The Dutch Food Security Policy's acknowledgement of the importance of participatory processes further suggests it could be a valuable addition.

3.4.4.8. Synergies between the Dutch food security programme and other Dutch policies and programmes

Are there synergies between the central/decentrally managed projects?

¹⁰⁷ Interview EKN, end line evaluation 2016.

Two times a year, EKN organises meetings with all project implementers involved in the food security programme. In these meetings, also implementers of centrally funded projects (managed by the Dutch Ministry of Foreign Affairs) are invited to take part. This way, synergies between the EKN food security projects and other large-scale programmes can be identified. From the information received it appears that the level of integration and cooperation with programs such as DGGF and DRIVE is limited. This could be further improved in the future to also strengthen the relations with Dutch private sector. With the new program focus of EKN on economic cooperation it is expected that more synergies will be sought with these programs.

3.5. Evaluation question 3: Costs and efficiency

To determine the cost-efficiency of the program and the number of beneficiaries reached, a clear definition of the targeted population must be made, based on a discussion of the target group according to the evaluation approach of IOB in relation to the target group defined by EKN. In this section, initial aggregates of beneficiaries for the whole project are presented. These numbers must of course be contextualized with the detailed information on impact on beneficiaries provided in subsequent sections. While the comparison is based on the most accurate information amassed, not all information was received or available due to the fact that most projects were not completed.

3.5.1. Direct and indirect beneficiaries

How many direct and indirect beneficiaries have been reached?

IOB defines beneficiaries as 'the food insecure that potentially benefit directly or indirectly from the interventions of the food security programme'. IOB defines the direct beneficiaries as 'those target groups that are clearly described in the project document'¹⁰⁸. The indirect beneficiaries are not targeted but are as a result of the program 'benefiting from increased employment, improved national food availability, reduced food prices relative to wages, or reduced food price differences between places or reduced price fluctuations in time'¹⁰⁹. The target group of EKN is however not restricted to the food insecure. Its focus on economic cooperation and on smallholder farmers with commercial potential indicate that existing commercial farmers that are not food insecure can still be targeted and counted as beneficiaries. Also several projects refer to smallholders as their target group, unfortunately the term smallholders is not further defined by the projects nor by EKN, so it is unclear if both mean the exact same target group. The number of food insecure cannot be specified, since projects did not register how many beneficiaries were actually food insecure. Most of the projects did not keep track of a baseline at the start of their projects, nor did they report about the food insecure in reports to EKN. We therefore base the evaluation on the number of beneficiaries reported by the projects.

3.5.1.1. Projects with direct beneficiaries

The definition of beneficiaries leads to a division within the category of enabling environment projects between projects with and without clear beneficiaries.

| | Link beneficiarie | S | |
|------------------------------|-------------------------|--|----------------------------------|
| Primary contribution/goal | | Rural population | Policy stakeholders |
| | Food security | ISSD CATALIST Agri-Skills aBi-Trust | Operationalization DSIP PASIC |
| | Economic cooperation | Intraregional trade Financial Inclusion KAM Support Fund | |

Table 14 - Projects and their relation to food security and economic cooperation

¹⁰⁸ IOB ToR (p.19).

¹⁰⁹ Idem.

Regarding enabling projects, a distinction is made between 'Market enabling projects' and 'Policy enabling projects'.

The 'Market enabling projects' (or Market projects) directly target and reach rural populations and contribute to market conditions that are conducive to value chain development, removing bottlenecks that prevent farmers and agri-business from increasing and marketing their production. Under Market projects the projects are placed that aim at, for example, increasing the access to financial services and loans (Financial Inclusion) and the removal of barriers for trade (Intra-Regional Trade), which has a direct effect on beneficiaries but not in terms of increased production. Kam Support Fund is also included in this section since it has supported several initiatives that connect Ugandan private sector with the Dutch business experiences.

The second group are 'Policy enabling projects' (or Policy projects) that do not directly reach the rural population but contribute to an enabling policy environment for the agro-sector. Projects in this group address for example the introduction or reforms of policies regarding crops and land (PASIC) or capacity building of institutions that are involved with agriculture such as the MAAIF (Operationalisation DSIP).

We have established that the portfolio consists of projects that directly target rural populations and those that work on institutional improvements and therefore do not have direct beneficiaries. For the latter group of projects it could only be argued that local populations might indirectly benefit after the institutional changes have occurred, but these relations are difficult to establish. For the policy enabling projects we have therefore chosen to separately describe the stakeholders (e.g. government, businesses) they directly targeted and in the section 3.6 describe the effectiveness of reaching the stakeholders per project in detail.

| Project number | Project title | Targeted stakeholders | Indirect beneficiaries |
|----------------|----------------------------|--|-------------------------------|
| 23473 | Operationalization DSIP | Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) | Food insecure and farmers |
| 23620 | PASIC | MAAIF, Policy officers and Statisticians | Private sector seed companies |
| m 11 m . | | | |

Table 15 below shows the stakeholders¹¹⁰ targeted by the policy enabling projects.

 Table 15 – Targeted stakeholders in Policy enabling projects

For the projects that did directly reach the rural population (both the Value chain projects and the Market projects), we provide an estimation of the number of direct beneficiaries (Table 16). This estimation is based on available information received from project implementers.

The number of direct beneficiaries reached in one project varies from the minimum of 4,363 (Kam Support Fund) up to over 70,000 (CATALIST and most likely for ISSD). However, the quality of the benefits is of course different for beneficiaries between as well as within projects. Most importantly, the level of support received by beneficiaries aligns with the distinction between the farmers-level projects and the enabling projects. The training in the first category is very intensive. In the second category the training was occasional and light. Specifying the exact number of indirect beneficiaries was not possible, since we did not receive the required information or it was unclear. Knowing that the number of indirect beneficiaries is unclear for most projects, and based on the broad definition used by IOB, we expect that the current total of 215,000 considerably underestimates the real number.

¹¹⁰ For the policy enabling projects, the word beneficiaries may be inappropriate, as their goal is not to directly target the food insecure. Therefore, the word 'targeted stakeholders' would be more fitting.

| Project number | Project title | Direct beneficiaries 2012-2016 | Indirect beneficiaries |
|----------------------|------------------------|-----------------------------------|---------------------------|
| Value chain projects | | | |
| 23615 | aBi-Trust | 10.000 | Unclear |
| 23616 | CATALIST Uganda | 70,000 | Unclear |
| 23617 | ISSD | 55,000+111 | Unclear |
| 23618 | Agri-Skills 4 You | 12,250 | Unclear |
| Market enabling pro | jects | | |
| 23619 | Trade Mark East Africa | 20,000+ | 100,000 |
| 25882 | Agro-Finance | 36,000+ | 100,000 |
| 23614 | KAM Support Fund | 4,000+ | 15,000 |
| | Total | 200.000 | 215.000 |

Table 16 – Beneficiaries of projects (in terms of farmers, not multiplied for all household members)

It is important to note that most of the projects had not been finalized when the end-line evaluation took place. Most projects were thus not yet able to report on the definite total number of beneficiaries. CATALIST and Agri-skills have given final numbers. ISSD project staff used a rough calculation based on the estimated number of farmers served per seed producer. Financial inclusion runs until 2018 and the number of total beneficiaries is anticipated by the implementer to be far higher. At the same time, most projects were extended without additional funding, and the project period thus exceed the evaluation period of 2012-2015. Because it is not feasible to determine the number of beneficiaries until 2015, we will use the numbers for the entire programme period as reported above, up until the end line visit in July 2016.

3.5.2. Project expenditures

How does project expenditure compare to the number of beneficiaries?

The information on project funding is based on the appraisal documents for the project budgets (BeMos)¹¹². Table 17 demonstrates the project budgets and income.

| Project number | Project name | Total project budget | Total EKN grant project duration ¹¹³ | EKN share (%) | Other project donors |
|-------------------|-----------------------------|-------------------------|--|---------------------|---|
| 23473 | Operationalizati on DSIP | \$2,251,090 | \$625,000 | 27% | GoU, World Bank/DfID, Denmark and USAID |
| 23614 | KAM Support Fund | €1,200,000 | €1,000,000 | 83% | GoU |
| 23616 | CATALIST Uganda | €15,000,000 | €15,000,000 | 100% | Single donor |
| 23617 | ISSD | €5,817,680 | €4,957,680 | 85% | N.A. |
| 23618 | Agri-Skills 4 You | €10,500,000 | €9,000,000 | 85% | N.A. |
| 23619 | Trade Mark East Africa | \$64,293,000 | \$10,000,000 | 16% | USAID, World Bank/DfID, Belgium, and Denmark |
| 23620 | PASIC | € 7,180,350 | €4,000,000 | 63% | N.A. |
| 25882 | Agro-Finance | €10,300,000 | €2,434,476 | 23% | N.A. |
| | | | | | |

 Table 17 – Project expenditures

The column 'total project budget' refers to the total funding for the execution of the project, including by other donors and the GoU. This amount refers to the entire project duration and often exceeds the

¹¹¹ These numbers are estimations and for projects with a '+' are not the definite numbers, because projects were still ongoing or because data is likely incomplete. See appendixes for the detailed calculations on number of reached beneficiaries.

¹¹² These amounts present the planned expenditures according to the BeMos.

¹¹³ Based on the information from the Pyramid finance system received in august 2016.

evaluation period of 2012-2015. While only CATALIST is fully funded by EKN, the source of additional funding is not always clear. The column 'total EKN Grant project duration' shows the amount EKN had allocated to projects by august 2016. For most projects the full amount has now been disbursed by EKN.

In the cost-efficiency analysis we will use the project expenditure until the end line evaluation in 2016. Out of nine projects in this portfolio evaluation, at least two formally started before the evaluation period as they were follow-up projects from a previous period under another project number (Trade Mark East Africa and CATALIST Uganda). In those cases, there was some budget left of the previous period, that has been used during the evaluation period. This means the expenditures are built up from two different periods. Most of the projects also lasted longer than the evaluation period covering most of 2016 as well. Furthermore several of the projects are attempting to continue with a follow up programme. This makes it difficult to isolate the exact expenditures between 2012-2015 (the official evaluation period) and more practical to use the entire project period, including 2016.

3.5.3. Value of effects per beneficiary and cost-effectiveness

To compare the costs to the number of beneficiaries, the information on beneficiaries and costs should be as reliable as possible, which poses some difficulties as discussed above. We did not receive all the information on direct and indirect beneficiaries, most of the time because project implementers did not monitor the exact numbers. Therefore we estimated the numbers based on progress reports and questionnaire data received, and validated these during interviews (for a topic list view Annex D).

Despite the above mentioned limitations we have calculated the costs per beneficiary (Table 18). We opted to use the total project budget and the direct beneficiaries between 2012 and 2016 to define the cost per beneficiary for the entire project duration. The numbers presented in Table 18 should be interpreted with care. All projects are unique in the sense that the interventions have different target groups of beneficiaries and operate in varying social contexts. The interventions themselves also differ. It may be possible to make meaningful comparisons between projects in the same project category and aimed at the same EKN MASP output. In Table 18 projects are therefore presented accordingly.

| Project number | Project name | Total project budget | Direct benefi- ciaries | Category of beneficiaries | Output | Cost / beneficiary project duration (2012-2016) | | |
|----------------------|---------------------------|--------------------------------|------------------------------|--|--------|---|--|--|
| Value chain projects | | | | | | | | |
| 23616 | CATALIST Uganda | € 15,000,000 | 70,000 | Farmers | 1 & 2A | € 214 | | |
| 23617 | ISSD | € 5,817,680 | 55,000 | Small holder seed growers | 1 & 2B | € 106 | | |
| 23618 | Agri-Skills 4 You | € 10,500,000 | 12,250 | Small-market oriented farmers and youth | 1 & 2A | € 857 | | |
| Market en | abling projects | | | | | | | |
| 23614 | KAM Support Fund | € 2,025,981 (\$2,251,090) | 4,000 | Farmers (dairy, livestock, potato) and MAAIF | 3 | € 506 | | |
| 23619 | Trade Mark East Africa | € 57,836,700 (\$64,293,000) | 20,000 | | 2A | € 2,890 | | |
| 25882 | Agro- Finance | € 10,300,000 | 36,000 | DFCU Bank and customers Women | 2A | € 286 | | |
| Total | | € 101,480,361 | 197,250 | | | € 514.5 | | |

 Table 18 - Project expenditures versus the number of beneficiaries

The ambiguity of the definition of beneficiaries and the effect this has on the cost-effectiveness appears from the calculation for ISSD. When considered compared to the other Value chain projects, 5,000 seed-producers have been intensively trained. However, the target group defined by the project covers the 50,000+ farmers buying the seeds, although, these have not been trained. Including them as direct beneficiaries, leads to a different cost-effectiveness outcome. On the other hand, the training for the 5,000 seed-producers might have been more intensive than the training with, for example CATALIST.

Because of these difficulties we use the number of beneficiaries as a very rough estimate of effectiveness and (equally crudely) assume that the effect value per beneficiary is the same for the different projects. With these assumptions the cost per beneficiary is a (negative) indicator of cost-effectiveness. Obviously this leads to first-order approximation of cost-effectiveness at best.¹¹⁴

With a budget of \bigcirc 46,500,000 EKN had foreseen¹¹⁵ to support roughly 300,000 beneficiaries. The realized number of beneficiaries with the total spending is lower with roughly 200.000 beneficiaries. This would have meant a cost of \bigcirc 155 per beneficiary and turns out to have been an underestimation compared to the realized \bigcirc 515 for projects with direct beneficiaries.

Conclusions:

At the programme level the average costs per beneficiary are \bigcirc 600. When we compare the project groups with each other, this results in an average cost per beneficiary of \bigcirc 390 in the Value chain projects, and \bigcirc 1,227 for the projects contributing to the enabling market environment. These costs are however not comparable since the market enabling projects in part consist of construction works which are able to benefit people in the longer run too, while these beneficiaries have not taken into account. CATALIST was the most effective in terms of reach (70,000 farmers) while ISSD had the

¹¹⁴ The restrictions to calculating the cost-effectiveness are the same to those in the Rwanda Food Security

evaluation which is why this literal text is used from that draft report.

¹¹⁵ From the MASP 2012-2015 and 2014-2017.

lowest cost per beneficiary (€106). The costs for Agri-skills are relatively high which makes sense since the training in agri-skills takes several months and are quite intensive. In the enabling group Agro-Finance was most successful in reaching the target group, including a specific focus on women, in the most cost-effective manner (€286). With regard to Intraregional trade (TMEA) a relatively low number of direct beneficiaries have been reached, while the activities which are most costly (construction works) reach a large group of indirect beneficiaries.

3.6. Evaluation question 4: Effectiveness of the programme

'What are the effects of a) the Dutch country programme and b) the selected projects on food security?'

In this section we will address the programme's and projects effectiveness based on our main findings of the end line assessment of the EKN portfolio. This analysis has a dual function: (1) determine to what extent the anticipated outputs and outcomes have been achieved and (2) define per project the (sustainable) impact of the project on food security.

In order to do so, we used desk research, the self-evaluation surveys performed by the project implementers and data collected through fieldwork. We use these results to answer the sub-questions related to the achievement of goals, the impact pathways and improvement of the food security at the household level.

Results are presented in relation to the intended outputs from the EKN intervention logic. This helps understand the contribution of each project on different food security aspects but also the degree to which the programme as a whole impacts. For each project the overall effectiveness is synthesized.

It is important to note that at the time of the end line visit and the writing of this report several projects had not yet finished. For each project the current and expected end results will be discussed.

3.6.1. Outputs

Project effects are discussed for each of the outputs as specified in the MASP 2014-2017. In line with our categorization of the projects, we have also separated output 2 between market enabling and policy enabling effects.

Output 1: Improved performance of selected agro-food value chains and actors.

Output 2: Enabling market environment is conducive for agribusiness in general and the selected agro-food value chains (Irish potatoes, rice, cassava, dairy and seed).

- 1. Enabling market environment
- 2. Enabling policy environment

Output 3: Dutch trade and investment promotion in the area of food security is enhanced.

Additionally, in presenting the results and the analysis of the Food Security effects we apply the distinction made in section 3.6, namely between the projects with direct impact on beneficiaries (output 1 and output 2.1) and the projects with mainly an indirect effect through an institutional and stakeholder focus (Output 2.2 and output 3).

The analysis in this chapter primarily focusses on the degree to which projects were able to reach the food insecure population. This is only relevant for those projects that had direct beneficiaries (see projects under 1 and 2.a). Analysing the direct food security effect is also only relevant for those groups. Therefore, while the output tables per project in de presentation of data below are the same, the 'food security' tables are different. For the policy enabling projects the indicators relate to the effectiveness in enabling stakeholders (indirect food security effect), rather than indicators on direct food security effects.

| HIK N | |
|-------|--|
| | |
| | |

Channels

Category

| Output | 1: Improved performance of selected | agro-food value chains | s and actors |
|--|---|---|-----------------|
| | 1.1 More use of quality outputs (incl. labour) | CATALIST ISSD Agri-Skills 4 You | Value chain |
| | 1.2 Productivity sustainably enhanced &1.3 Competitiveness increased | CATALIST ISSD Agri-Skills 4 You | Value chain |
| | 1.4 Agro-processing increased and more efficient | CATALIST | Value chain |
| Output 2: Enabling environment is conducive for agribusiness in general and the selected agro-food value chains (Irish potatoes, rice, cassava, dairy and seed). | | | |
| | 2.A.1 Access to financial services enhanced | Financial inclusion | Market enabling |
| | 2.A.2 Reduced trade costs & Regional integration | Intra-regional trade CATALIST | Market enabling |
| b. Enab | ling policy environment | | |
| | 2.B.1 Public functions – regulatory, conducive research and technology transfer | Agri-policy action Operationalization DSIP ISSD | Policy enabling |
| | 2.B.2 Regulatory framework enhanced | Intra-regional trade Agri-policy action | Policy enabling |
| | 2.B.3 Conducive research | Agri-policy action | Policy enabling |
| Output enhanc | 3: Dutch trade and investment prom ed | otion in the area of food | d security is |
| | 3.1 More Dutch trade and investment | KAM support fund Operationalization DSIP | Market enabling |

Table 19 - Projects and sub-outputs for each EKN food security output

3.6.2. Effectiveness of value chain projects

To what extent is the anticipated pathway followed / have results been achieved?

For each project we describe the results and thereafter the contribution to food security to determine the extent to which the anticipated pathways have been realized. To do so, we present for each project a set of two tables. The first one is a summary of the main output and outcomes achieved for that project, the second one determines the level of food security improvement for that project. Afterwards we give a brief conclusion on the project effectiveness.

3.6.2.1. 23616 CATALIST-Uganda

CATALIST-Uganda uses a productivity push and market pull approach to increase rural farm incomes and create market surpluses through sustainable commercialization of smallholder agriculture. By integrating smallholder farmers into value chains, CATALIST aims to increase yields, decrease production costs, add value and develop markets for potatoes, cassava and rice.

| Objectives | Outputs | Outcomes |
|--|---|--|
| CATALIST-Uganda aims at sustainably commercializing | Outputs according to project reports and staff interview: | Outcomes according to project reports and staff interview: |
| smallholder agriculture through improved productivity and market development | 70,235 farmers have been reached. Original target: 110,000. Adjusted target after mid-term review: 65,000. ¹¹⁶ | (O1) ¹²⁷ . An average of 20% of total |
| resulting in marketable surpluses that raise farm incomes in Uganda | Over the course of the project 100,000 metric tons of marketable cereal equivalent has been produced. ¹¹⁷ The orignal target was 165,000 tons annually. ¹¹⁸ | participating fainlets undertaking collective storage and sale of produce and 14,080 farmers undetaking collective bulking and selling of produce. (O3). 7 partnerships with Dutch agribusinesses (in the field of potatoes and rice) 14 partnerships with SME's (in the field of rice, potato, cassava and soybean). (O4). Through lobby for reforms 5 policy requests submitted and 5 policy dialogues conducted in collaboration with PASIC and ISSD. |
| 2. increase food security for the wider East Africa and Great Lakes Region. 3. ABC actors develop | In 2014 participating potato and rice farmers increased income by 100+%. Target: 50%. ¹¹⁹ Control group income increased with 70%. | |
| a ABC actors adapt and lobby for reforms in business environment. | Productivity of targeted commodities increased ¹²⁰ : - potato from 2,753 Kgs per acre to 5,400 Kgs per acre - rice from 648 Kgs per acre 1,470 Kgs per acre - sun flower from 405 Kgs per acre to 637Kgs per acre | |
| | Farmers utilize more quality agro-inputs, technical advice, savings and credit. 76% of the farmers adopted at least two inputs. ¹²¹ Target: 60%. | |
| | Quality seeds use amongst participants up from 35.5% in 2013, to 47.2% in 2015. For fertilizers, from 37% to 40.4 between 2013 and 2015. ¹²² | |
| | 1731 farmer groups formed. 316 farmer group clusters have registered and formalized their legal status. ¹²³ | |
| | - 17,500 farmers adopt value addition through processing and 1016 farmers sensitized on value addition. ¹²⁴ | |
| | 75km of roads constructed in the rural project areas. ¹²⁵ | |
| | Costs for production and marketed prices reduced by 30% for participating farmers. ¹²⁶ | |
| Table 20 – CATALIST-Uga | nda outputs, outcomes and conclusions | |

| Level of food security improvement | 23616 – CATALIST-Uganda |
|---------------------------------------|---|
| Food security objective? | Explicit. By the end of the project 65,000 smallholder farmers will have doubled yields, achieved a 50 percent increase in incomes, and produced an annual marketable surplus of 200,000 metric tons of cereal equivalents. (revised figures) |

¹¹⁶ Original targeted beneficiaries of 110.000 smallholder farmers was revised to 65.000 after MTR 2015.

124 Idem

¹¹⁷ Total produce according to program manager during endline interview, July 2016.

¹¹⁸ Number is not consistent: production target in self-assessment in 2016 was 200.000 metric tons instead of 165.000.

¹¹⁹ According to questionnaire reported in Annual report 2014. Reliability of source unknown.

¹²⁰ Questionnaire 2016. This was not an independent study and the quality of applied research methods is unknown.

¹²¹ From interview with program manager, from questionnaire 2016.

¹²² Annual report 2015.

¹²³ Idem.

¹²⁵ Idem.

¹²⁶ End-line interview, July 2016. Reliability of this number is unknown.

¹²⁷ (O1.) refers to the number of the related objective.

| Number of direct | 70,235 ¹²⁸ farmers have been reached as direct beneficiaries. |
|--|--|
| beneficiaries, and targeting food insecure? | These were not necasarilly food insecure farmers, but those with potential for commercialization. |
| Increased food availability (likely/evidence) | Yes, 100,000 metric tons of cereal equivalent over the course of the project (mainly rice, potato and casava). The projects measures the tons of cereal produced. It is likely that the reported numbers are accurate and that the food availability has increased. However it |
| | cannot be known how much would have been produced if the project had not existed. |
| Increased food accessibility | Likely, income increases of up to 100% for potato and rice farmers are reported.Income increase of 38% for oilseed farmers. |
| (likely/evidence) | Based on these figures alone it cannot be determined how purchasing power is affected. It is likely that farmers can purchase more food. Actual spending is however unknown. |
| Enhanced food stability (likely/evidence) | Likely some effects. Drought resistant varieties and slow releasing fertilizers have been introduced (on a small scale) into the project. These could enhance stability in production over time. |
| Enhanced food utilization (likely/evidence) | No evidence. The project did not include the monitoring of the utilization of food/nutrition, thus no record is made of this objective. |
| Private sector development (likely/evidence) | Yes, at least 7 cooperations with Dutch business and 14 with SMEs. Finding 'lead' agri-businesses with demand and linking them to bulk suppliers has been challenging as well as partnerships with Dutch businesses ¹²⁹ . Less private sector impact than anticipated. |
| Other (Policy Letter 2014 and MASP 2014- 2017) | The 2015 Annual Report mentions a high number of farmers sensitized and trained on gender mainstreaming: 102 staff, 95 FGCs, 150 Community Change Agents (CCA and 20,000 farmers ¹³⁰ have been reached in this manner). |

Table 21 - CATALIST-Uganda and food security indicators

Conclusions:

Regarding output 1.1, 'more use of quality inputs' based on their own information CATALIST has been successful in promoting the use of more inputs. However, savings and credit were also considered inputs, while these are not classified as such in the MASP, but noted separately. For some specific inputs uptake was lower than anticipated, particularly for fertilizers (only from 37% in 2013 to 41% in 2015). Regarding output 1.2, in general CATALIST appears to have contributed to increase in the productivity of farmers with a reported surplus of around a 100,000 metric tons. Especially for potato and rice production output was increased. Sunflower and soy beans production increases were lower and for soy production even decreased by 1.2 metric tons in 2014.¹³¹ These have turned out to be more difficult crops and a reason for CATALIST to further limit their focus by ending their work in the Northern region in the next phase. The clustering in farmer groups (allowing for bulk selling), increase in production, reduction of production costs and initiation of value addition and processing have likely added to increased competitiveness. These are however largely driven by capacity building. This did not fully translate into better business, as finding markets has been a challenge, which is why after the mid-term evaluation CATALIST shifted to demand driven, agro-business led, training of farmers. General increase in income is reported and points to an improved market position of farmers. This evidence is however insufficient to make this conclusion. With regard to output 1.3, 17,500 farmers adopted a form of food processing. Entrepreneurial food processing activities were promoted. Project staff did note that results were limited, mainly because people lacked initiative. Efforts have been made to engage young people in processing. Number of youth engaged is unknown.

With regard to output 2.2, CATALIST has contributed to reduced trade costs through the construction of 70 km of access roads from farming areas to the main market areas in specific locations in south-western Uganda. According to project staff this has contributed to significant reductions in transport costs of 30%, as less time is spent on transport and bulk transport becomes easier. It is of course

¹²⁸ Idem.

¹²⁹ Interview project staff, end-line 2016.

¹³⁰ Based on the progress report 2015 (page 48).

¹³¹ Due to lack of quality seeds according to project staff, which appears strange as the project was half way.

difficult to determine the actual reduction of transport costs for all beneficiaries, nevertheless, good infrastructure is a fundamental bottleneck for marketing of products, undoubtedly leading to reduced transport costs.

3.6.2.2. 23617 KAM Integrated Seed Sector Development

The main objective of ISSD is to increase the availability of quality seeds for various crops. To achieve sustainable access to affordable quality seed, a vibrant, and pluralistic and market oriented seed sector is necessary. The project has two main components: Establishing functional seed businesses and creating a supportive public sector. The project has only recently been scaled-up and started moving at full speed, before it finishes end of 2016. The final project outcomes are thus still uncertain.

| Objectives | Outputs | Outcomes | Conclusions |
|--|--|--|--|
| The main objective of ISSD is to increase the availability of quality seeds of food security crops. | Outputs according to project reports and staff interview: The initial goal was to reach 130 functional Local Seed Businesses | Outcomes according to project reports and staff interview: | Although activities took longer than planned, according to ISSD, most outputs are to a large extent being realized. |
| Sustainable access to affordable quality seed of superior varieties, of locally adapted crops and varieties Viable and sustainable foundation | (LSBs). 100 LSBs have been established. ¹³² 3,000 to 5,000 seed producing farmers. Target: 5200. (of which 25% women). ¹³³ | (O2.) Initial 30 LSBs are completely independent and they only reach out in case they | Access to sufficient foundation seeds remains a difficulty. Another struggle is the demand side. More activities are being undertaken for |
| seed system with seed producers having access to breeder and foundation seeds of requested varieties in the required quantities | 70,000 farmers with access to quality seeds. On track for goal of 100,000. ¹³⁴ Farmers using the seeds improved their crops by at least | The LSB membership composition is | awareness creation of benefits of buying quality seeds. The project struggles with gathering evidence |
| - A differentiated system of seed quality control - Functional variety release system with 2 year trials 3. Creating a | 20% per season. (target of 50%) ¹³⁵ Estimated 50 metric tons additional production until July 2016. ¹³⁶ Project staff confirmed general income increases of seed growers. Not specified (target: | now over 50% female, of which 30% hold a leadership position. ¹³⁸ | on its successes in creating a supportive public sector. According to several sources ¹³⁹ the ISSD has become a visible and respective player in the seed sector that has great contacts with its stakeholders such as the MAAIE |
| supportive public sector. | Collaboration and innovation for institutional change: Department for Crops Inspection and Certification/NSCS. ZARDIs cooperation. (number unknown) ¹³⁷ | | NARO and USAID. |

¹³² End line interview 2016.

¹³³ Idem.

¹³⁴ End line interview 2016 and annual report 2015. WUR-CDI monitors up until the availability of quality seeds, thus extrapolation.

¹³⁵ Idem, reported results based on samples and test fields. Research results not coroberated in this evaluation. 136 From end line interview, estimations based on project data which have not been authenticated as part of the evaluation.

¹³⁷ The 2015 Annual Report.

¹³⁸ The 2015 annual report

¹³⁹ Including interviews with EKN, PASIC and ISSD.

| Level of food security | 23617 – KAM Integrated Seed Sector Development |
|--|---|
| improvement | |
| Food security objective? | Explicitly. The goal of the programme was to provide access to affordable quality seed to at least 100,000 farming households. |
| Number of direct beneficiaries, and targeting food insecure? | 3,000 to 5,000 seed producing farmers. 70,000 farmers being able to access quality seeds.¹⁴⁰ On track for reaching 100,000 farmers with better seeds. Amongst the farmers are all gradations of producers: from commercial to subsistence. While it is likely that a share is food insecure, the food (in)security status of beneficiaries is unknown. |
| Increased food availability (likely/evidence) | Yes, estimated 50 metric tons additional production.¹⁴¹ According to project estimates, yield of farmers using LSB's quality seed improved by at least 30%. |
| Increased food | Likely, reported but not sufficient data available. |
| accessibility (likely/evidence) | - According to ISSD producers' incomes increased by producing seed as |
| | opposed to grain. Increased income can lead to higher food purchases, but this information is not available. |
| Enhanced food stability | Not reported on. Lack of structural demand for seeds from farmers restricts |
| (likely/evidence) | stability. Supporting evidence: project investment narratives show men invest in motorcycles and women in goats and chickens. Resources enhance year round resilience to shocks. Diversity seed varieties, also climate resistant, allow for climate adaptation. |
| Enhanced food utilization (likely/evidence) | Indirectly, highly nutritional crops are introduced, including leafy vegetables, legumes, peas, ground nut. Improved variety seeds including iron beans are promoted and have higher nutritional values. It is unclear how much farmers |
| | use these seeds. |
| Private sector | Likely, supporting entrepreneurial farmers with business opportunity. |
| (likely/evidence) | - Providing small farmers as well as larger commercial farmers with quality |
| | inputs. |
| | Interest of Dutch seed companies in Uganda reported. ¹⁴² Private sector development is feasible. One partnership with Dutch company noted during end line interview. |
| Other (Policy Letter 2014 and MASP 2014- 2017) | Attention is paid to the inclusion of women in the production and business of seeds, which is in line with the MASP's goal of promoting women's rights. Limited supporting evidence. Climate change is addressed by diversifying seed availability suiting different weather conditions. |

Table 23 - ISSD and food security indicators

Conclusions:

With regard to output 1.1, according to the project information the number of farmers across Northers and Western Uganda using quality seeds has significantly risen. An estimated 70,000 farmers have access to seeds now and this is expected to increase to 100,000 before the end of the project. It appears a large number of farmers receives seeds for free from government and NGO's buying from seed producers. Access to this input might therefore not be sustainable. The project has contributed to the capacity of ZARDI's and the providers of the foundation seeds, and started pilots for seed-farmers to start producing foundation seeds. Access to foundation seeds remains a key constraint as distance to the institutions and availability are an issue. With regard to output 1.2, Tests plots have been used and affirm that overall the quality seeds lead to higher yields than the traditional seeds obtained from last season's production. Estimated total increase in production from the project is 50 metric tonnes. It is however difficult to know how accurate this information is as the project collects data up to seedproducer level and the condition of test plots are not always representative of real conditions. Although this should be stated carefully, the outcomes suggest that competitiveness of seed-producers

¹⁴⁰ End line interview 2016 and annual report 2015. WUR-CDI monitors up until the availability of quality seeds, thus extrapolation.

¹⁴¹ From end line interview

¹⁴² The 2015 Annual Report states that there is considerable interest from private sector for partnerships.
has increased. According to project staff farmers' incomes have increased by producing seeds instead of grain, as the revenue from seeds is higher. No evidence has been provided to support this statement. The reluctance of most farmers to pay for seeds remains an issue. Moreover, the time delay between seed production in one season and sale in the next led farmers to sell the seeds as grain against lower prices. The exact cases in which this occurred is unclear, but a new pilot has been started to overcome this coping strategy.

Component two of the ISSD project focusses on improving the policy environment for seed production systems and thus contributes to output 3.2 'regulatory framework enhancement'. Together with PASIC the project has made good strides to make counterfeit seeds illegal and the project has realized a seed quality assurance body in one district. Although the project staff admitted finding it difficult to monitor and present its impact, several interviews confirmed that the project is considered by the government at different levels as an important stakeholder in developing the seeds policy framework. The project also contributed to 3.1. 'Public functions improved' through cooperation with ZARDI'S, making these local institutions more effective and popular with farmers. The continued relevance of this institution for seed producers depends on the capacity of LSBs to continue the cooperation (see 3.7 on sustainability).

3.6.2.3. 23618 Agri-Skills 4 You

The project aims to teach youth interested in farming and existing farmers enhanced production skills, with special attention for learning market skills. The project works in three northern districts and has set up courses with a curriculum based on local market studies to ensure courses are commercially relevant.

| Objectives | Outputs ¹⁴³ | Outcomes | Conclusions |
|---|---|--|---|
| Increased income and improved food security for rural households in the | Outputs according to project reports and staff interviews: | Outcomes according to project reports and staff interviews: | With regard to the training activities outputs have largely been met. Agricultural skills |
| northern sub-regions of Uganda: Lango, Acholi and West Nile. | 1. 2,771 youth ¹⁴⁴ trained with relevant skills for the agricultural or agri-business labour | (O1.) (Unknown) share of the participating youth and farmers have received relevant skills training for | trainings have increased the capacity of participating youth and farmers, increasing their |
| Training youth and farmers in production and marketing skills. Effective trainers and training | market or self- employment, of which 36% are female (target 2,000) | the agricultural labour market and use the new skills to produce cash crops and high value | labour opportunities. BTVET's have been strengthened and reported shortcomings in |
| institutions. | received (part) bursaries for short and longer term agriculture related | horticulture) for the markets. | the program, such as facilities and materials, have partly been addressed. Lack of |
| | 3. 604 graduates received toolkits/start-up | training providers maintain relations with students and both are | committed management of BTVETs remains an issue. |
| | (target 1,500) and 2,507 farmers (target 7,500) 4. 9,502 farmers trained in relevant skills using an on- | part of a network of relevant stakeholders | including the private sector, through job creation and value chain integration with agri- business to sell in bulk. |
| | farm/mobile training approach (target 10,000) 5. 17 BTVETs supported and 15 VTIs received | | instances but not structurally. Initial problems with lack of motivation among |

 $^{\rm 143}$ Reported progress until 2014, based on results from the Mid Term Evaluation (9 June 2015), self-assessment and evaluation visit 2016.

¹⁴⁴ Based on Endline questionnaire (2016), update including 2015 results

| infrastructure | students | has | been |
|---------------------|-------------|-----------|--------|
| support | overcome | through | better |
| 6. 1,137 youths and | selection. | Burdens | s for |
| 1,209 farmers | women | enrolment | t not |
| informed on Sexual | fully o | vercome, | e.g. |
| and Reproductive | distance | is one o | of the |
| Health Rights | restriction | ıs. | |
| | | | |

Table 24 – Agri-Skills 4 You outputs, outcomes and conclusions

| Level of food security improvement | 23618 – Agri-skills 4 you |
|--|--|
| Food security objective? | Explicit, the project enhances access, quality and relevance of agricultural Business, Technical and Education and Training (BTVET) in northern Uganda with the overall goal of improving income and food security. |
| Number of direct beneficiaries, and targeting food insecure? | Roughly 12,000 direct beneficiaries: 2,771 students have been educated in agricultural practice. 9,500 farmers have received training.¹⁴⁵ Targeted beneficiaries were largely self-sufficient or had low incomes. These numbers therefore included food insecure people, although it is unclear how many or how food insecure. |
| Increased food availability (likely/evidence) | Likely, 96% of youths and farmers indicated their agricultural production increased (for 12% this was a substantial increase and for 84% a relative improvement). ¹⁴⁶ There is no reliable aggregated data on how much additional food has become available. |
| Increased food accessibility (likely/evidence) | Likely: Incomes of farmers increased but not specified how much and for how many of them. Supporting evidence: individual cases in which income increased by up to 50%. ¹⁴⁷ It cannot be ascertained that this is representable. |
| Enhanced food stability (likely/evidence) | Likely, to some degree: In VTI's students were trained in mixed farming, producing several types of food products to decrease dependence on single crops. However, the curriculum is not standardized, thus not a general conclusion. |
| Enhanced food utilization (likely/evidence) | No evidence. Students are thought in horticulture whereby vegetables otherwise not available are introduced to the local market. Dietary diversity is likely influenced. The actual effect is unknown. |
| Private sector development (likely/evidence) | Limited evidence, expected to some degree: The project contributes to private sector development through training farmers in commercial production, by providing internships, and by integrating farmer groups into value chains with agri-business. No reliable estimations on the scale of effective business development. |
| Other (Policy Letter 2014 and MASP 2014- 2017) | Successful in making agricultural sector employment more attractive to youth and women. 35% of youth trained are women. Raising awareness of Sexual and Reproductive Health Rights is also in line with the policy letter. |

Table 25 - Agri-Skills 4 You and food security indicators

Conclusions:

Under output 1.1, 'More use of quality inputs', it is explicitly mentioned that this is 'including labour skills'. The project has trained roughly 2,300 students (considering the project is still ongoing) and 9,500 farmers in enhanced production skills. Of these, the number of students is most reliable and best registered. A reported 600 students and 900 farmers received start up kits. Reliability of these numbers are unknown. The kits included inputs relevant to the skill they had learned (e.g. horticulture or piggery) and included protective clothing, tools, quality seeds, or some animals. These were provided on merit-basis through competition. The Mid Term Review in 2014 however disclosed serious issues with the starter kits. Very few had been provided, even when they had been promised, some were incomplete or students received a kit for something they had not been trained in. It is therefore likely that the number of complete and properly allocated toolkits is significantly lower than

¹⁴⁵ Based on End line interview, update including 2015 results

 $^{^{\}rm 146}$ Analysis from the online M&E system, Annual report 2014.

¹⁴⁷ Annual report 2014 and 2015.

reported. Regarding the training, the report mentioned high drop-out rates, dis-interest of students, and a failure to include practical classes. In our visit, local project staff noted that these issues had been overcome, mainly through better selection of students, and improvements to teaching methods. Although this seems probable, it does mean that the number of effectively trained students is likely lower than reported.

Regarding output 1.2, aggregate numbers on production increase are not available. The annual reports do provide narrative evidence of graduated students who increased their production. The independent project impact study showed 96% youth noted to have increased income. While a large number of respondents had been interviewed, the exact questioning and conditions under which it has been taken are unclear. The curriculum was based on a market analysis. Farming of food types with high marketable value were thought, including horticulture and animal farming. This reportedly increased the employability and competitiveness of the graduates. Farmer groups were formed, creating a better market position through bulk selling. At the same time, project staff noted lack of jobs for many students in agriculture and limited encountered opportunities to link farmers groups to agribusinesses, suggesting employability and competitiveness remains an issue. No accurate information is available on number of farmer groups created and successful value chain integrations.

3.6.3. *Effectiveness of market enabling projects* 3.6.3.1. 25582 Financial inclusion – DFCU

The project aims to bring bank services to a new segment of the population, SMEs and rural population, with finance products that suit their needs, starting in Northern and Western Uganda. To accomplish this, the project consists of several components aimed at internal capacity building as well as product development and tailoring products to the agro-sector. The project is half way (ending in 2018) and effects for the entire project can therefore not be given.

| Objectives | Outputs ¹⁴⁸ | Outcomes | Conclusions |
|-----------------------|---------------------------------|---------------------------|----------------------------|
| Structural | Outputs according to | Outcomes according to | Rural households have |
| improvement in the | project reports and staff | project reports and staff | gained access to finance |
| access to financial | interviews: | interviews: | and the bank has |
| services, deepening | | | consolidated its position. |
| agri-finance and | - Number of agri | | The project has not been |
| mobilization in | to 150 agri austomora | (01/02.) Through pilots | able to make as much |
| Higginda thereby | and 61 | and with new products | progress in banking the |
| contributing to the | cooperative/farmers | more rural clients have | unbanked' in rural areas |
| development of the | groups (target 330. | so fai been engaged. | as was expected. |
| country's rural | 20% cooperatives). | | and the step states. |
| economy. | - Save for loan | | The food security impact |
| 1. Rural households' | programme with 164 | | is not clear. It is |
| access to financial | farmer groups in the | | uncertain yet to what |
| services has been | north. ¹⁴⁹ | | degree the loans and |
| increased. | - The agri loan portfolio | | improved access to |
| Tailored financial | is 13% of total lending | | finance have led to |
| products | assets (on 30 June | | improvements in terms of |
| introduced and | 2015) Non Douforming Ami | | agricultural productivity |
| used | - Non Performing Agri | | and mereased meome. |
| a Ingrassa tha | (at June 20, 2015) and | | There seemed to be some |
| 2. Increase the | 13% ¹⁵⁰ in July 2016 | | difference in vision |
| number of agri | vs a target of 5%. | | between Rabo |
| customers and | - 6.330 registered | | Development and the |
| DFCU retail | Women in Business | | DFCU, suggesting DFCU |
| customers. | program participants | | is less committed to the |
| 3. Financial literacy | (target 25,000). | | focus on the agri sector. |
| improved, | - 16,000 total people | | |
| | trained in Financial | | Capacity building of |

¹⁴⁸ Based on DFCU Progress Report 2015 and Questionnaire (2016), most numbers were as of 30 June 2015.

¹⁴⁹ Interview with regional staff, field visit 2016.

¹⁵⁰ Interview country-wide project staff, field visit 2016.

| including women, and female entrepreneurship ⁻ has been promoted. | Literacy (3,500 women) Overall number of retail customers is 417,312 of which 29% and 17% are women and youth respectively | DFCU bank staff is a large component while agro targeting is a relatively smaller component. Appears less focused on FS. |
|--|---|---|
|--|---|---|

Table 26 – Financial Inclusion outputs, outcomes and conclusions

| Level of food security | 25882 – Agro-finance |
|--|--|
| Food security objective? | The project explicitly aims to increase rural access to financial services and also targets agribusiness and farmer groups with the objective to strengthen the banks position in this segment and to strengthen the agri-sector in Uganda. The food security objective is only implicitly part of this objective. |
| Number of direct beneficiaries, and targeting food insecure? | - 9,877 direct beneficiaries. Specifically targeting rural households and to some extent women. - 4,000 farmers reached through at least 164 farmer groups provided with access to finance.¹⁵¹ - 6,000 + 3,500 women involved in training programmes It is unknown whether these beneficiaries are food insecure. |
| Other or indirect beneficiaries | - 152 agri customers (large agri-businesses) and 61 cooperatives. It is not clear if they have been reached as part of the financial inclusion project. |
| Increased food availability (likely/evidence) | Unknown. According to regional staff and partner NGO AgriTech farmers groups using the Safe for Loans product realized fast increases in production compared to others. ¹⁵² No quantifiable results have been reported to support this. |
| Increased food accessibility (likely/evidence) | No evidence. Even if services lead to higher production and revenue, due to high interest rates ¹⁵³ net income effect would be less pronounced. |
| Enhanced food stability (likely/evidence) | No evidence. Assumptions: through rural banking and financial literacy, the number of farmer groups and people saving money has increased. ¹⁵⁴ Financial capital enhances resilience to cope with seasonal food shortfalls. On the other hand, loans with high interest rates lead to additional risks. |
| Enhanced food utilization (likely/evidence) | Not directly. |
| Private sector development (likely/evidence) | Yes, project consists of capacity building of the DFCU Bank by Rabo Development as shareholder. Through this cooperation the DFCU bank has so far provided services to a group of SMEs and rural entrepreneurs that previously did not have access. |
| Other (Policy Letter 2014 and MASP 2014- 2017) | The project establishes a Women Business Advisory Council and a specific Women in Business Programme. Without the financial inclusion project this might also have been done. Aligned with MASP 2014-2017 focus on improving access to financial services. |
| Counter-factual dynamic | Loan interest rate is high with 24% ¹⁵⁵ . Several cases have been noted in which farmers defaulted on loans or needed to take an extension or new loan for repayment. This dynamic likely reduces food security. Actual number of such cases is unknown. |

¹⁵¹ Number until July 2016 for the Norther region, calculation based on average of 25 members per group as suggested in interview with regional staff. The product is also used in the South-western region but data was not provided for this area.

¹⁵² Interview with partner of DFCU, Technoserve, field visit 2016.

¹⁵³ Interest rate around 24%. Although 13% was also mentioned, this is most likely a subsidized rate.

¹⁵⁴ Idem.

 $^{^{155}}$ In the interview with the regional office an interest rate of 13% was mentioned, but other stakeholders confirmed the regular rate to be 24%. See (3.8) unintended negative effects for discussion on this high interest rate.

Table 27 – Financial Inclusion and food security indicators

Conclusions:

The project contributes to output 2.1 'financial services enhanced'. So far the number of beneficiaries reached is moderate and behind on target. The agri-module focuses on agri-business and farmer cooperatives and has increased the number of agro-customers. The 'safe for loan' product has been introduced in two regions. Loans are only provided to farmer groups. Through effective collaboration with NGOs 164 farmer groups in the Northern region alone have received loans. Nor project staff in the North nor at the head office could inform the evaluators of the number of safe for loan groups in the West. Coordination within the project thus appears ineffective. Because of limited staff, scepticism of farmers and high loan interest rates the 'safe for loan' product has not really taken off. The services that are provided are reported to have been appreciated by farmers, with follow up loans and referrals to other farmer groups¹⁵⁶. Financial literacy training has been provided to all types of (potential) customers, reaching 16.000 in total. Part of the 'safe for loan' is a training in financial literacy. This is very 'light' and consists of a short presentation by the DFCU staff after which farmers can ask questions. The actual training is given by the partner NGOs (not funded by the project). It is also possible for farmer groups to take a bank account without a loan. According to local staff several groups make use of this option. One major problem of the current service is the need for customers to go to the bank for enquiries and withdrawals, and the fact that group leaders manage accounts for the whole group, which brings the risk of fraud. The project implementer expects mobile banking, which will be initiated at the end of 2016, to provide a solution to the barriers to rural outreach, costs reduction and personal services. The high interest rates of 24% are another restriction to widening the rural customer base. Financial Inclusion intends to bring this rate down. It is not possible to draw final conclusion on the effects of the Financial Inclusion project as the project will not be completed until 2018.

3.6.3.2. 23619 Intra-regional trade

Intra-regional trade is a project which is taking place in the Eastern-African region and includes several of Uganda's neighbours in order to integrate the markets and allow for easier import and export. The project consists of infrastructural projects and soft-infrastructure (management systems) in order to allow for faster and cheaper cross-border trading. Intra-regional trade mainly contributes to sub-output 2.B.2 'reduce trade costs'.

¹⁵⁶ Interview with regional office staff and development partner (Technoserve), end line 2016.

| Objectives | Outputs ¹⁵⁷ | Outcomes | Conclusions |
|------------------------|---------------------------|--|---|
| TMEA Uganda aims at | Outputs according to | Outcomes according to | TMEA has completed its |
| removing trade | project reports and staff | project reports and staff | activities and most |
| opening up (regional) | interviews. | interviews. | outputs. |
| markets. | 1. Time and costs | | Import and export has |
| 1 Trade environment | export: from 28 days | (O1.) Total value of exports from the EAC | become more efficient due to trader friendly |
| of Uganda is | and USD2,800 to 7 | region has increased. | procedures. Trade costs |
| enhanced by | Luport: from 21 days | _ | have been significantly |
| strengthening the | and USD3 378 to 13 | - Uganda Revenue | reduced. As the project |
| infrastructure and | days and USD1.176. | Authority has | it is not clear what the |
| institutions that | 2. Total exports from | experienced a 48% | results are in terms of |
| facilitate (regional) | the five EAC Partner | increase in customs | export and import. |
| trade. | States increased with | LIGX2 otrillion | The project has |
| | 6.6% average growth | (2011) to | successfully made cross- |
| 2. Trade efficiency is | (target 5.2% | UGX4.3trillion (June | border trading more |
| promoted by reducing | growth) ¹⁵⁸ | $2015)^{159}$. | accessible to informal |
| costs for cross-border | 3. Certifying products | | traders, farmers and |
| transport. | for intra-regional | (O2.) Border posts have | women. |
| thansport. | trade takes 7 days | become more user | |
| | Instead of 19 days. | triendly for small-scale | |
| | 4. Customs clearance | are more aware of the | |
| | (2011) to 1.5 days | process of 1-border-stop | |
| | (June 2015). | 160 | |
| | 5. over 22 companies, | | |
| | that account for over | | |
| | 80% of customs | | |
| | revenues, have been | | |
| | authorised as | | |
| | Authorised Economic | | |
| | Operators; | | |
| | 6. 21 Small and | | |
| | Medium Sized | | |
| | companies were | | |
| | bureau (target 20) | | |
| | 7. 20.968 farmers | | |
| | sensitized for cross- | | |
| | border trade. | | |
| | 8. 21,000 farmers | | |
| | sensitized on maize | | |
| | standards. | | |
| Table 28 – Intra-regio | onal trade outputs, out | comes and conclusions | · · · · · · · · · · · · · · · · · · · |

¹⁵⁷ Results from Questionnaire (2016)
¹⁵⁸ Annual report 2015
¹⁵⁹ Result from Questionnaire (2016)

¹⁶⁰ Apart from the interview with project staff, this was confirmed during the Focus Group Discussion.

| T 1 CC 1 | |
|--|---|
| Level of food security | 23619 – Intra-regional trade (IMEA) |
| Food security objective? | Implicitly, the project goal is to increase trade with a focus on increasing physical market access, enhancing the trade environment and increasing the competitiveness of the private sector. Reducing trade costs for small traders, farmers and women is part of this objective |
| Number of direct beneficiaries, and targeting food insecure? | Number of beneficiaries unknown. Women in trade, informal cross border traders, farmers in the private sector targeted directly. Not known what share of beneficiaries is food insecure. |
| Increased food availability (likely/evidence) | No evidence. Assumption: increased availability of imported food from non-EAC countries into Uganda. Faster border control ¹⁶¹ leads to reduced food wastage and more food being available for consumption. |
| Increased food accessibility (likely/evidence) | Yes, Roads and border posts enhance physical access to markets for producers and consumers. Indirectly: reduction in import and export costs, could in turn result in lower product prices. |
| Enhanced food stability (likely/evidence) | Too little information. Supported assumption: cases of increased export to bordering countries to compensate for temporal shortfalls. ¹⁶² Cheaper import can compensate seasonal shortage in Uganda. |
| Enhanced food utilization (likely/evidence) | Unknown. |
| Private sector development (likely/evidence) | Yes, the project has stimulated registration of informal business and taught quality standards (e.g. packaging). 21 producers received quality certificates to enhance intra-regional trade and receiving higher prices. Uganda Trading Across Borders (TAB) score from 161 (2015) to 128 (2016) in Doing Business 2016 ranking. |
| Other (Policy Letter 2014 and MASP 2014- 2017) | Improving regional and global trade, developing infrastructure and increasing chain efficiency aligned with Policy Letter 2014. |

Table 29 – Intra-regional trade and food security indicators

Conclusions:

The intra-regional trade project has contributed to output 2.7 'reduced trade costs and regional integration'. As reported by the project, many of the targets of reducing trade costs and increasing import and export have been realized. It is not clear how these figures have been determined and what their reliability is. Visit to the Busia (Kenya) border post pointed out that many inefficiencies remain which were not reported. The time and cost for import/export, for crossing Uganda with cargo and for border clearance have been reduced. This is realized through innovations that address specific inefficiencies, such as the one stop border and the electronic tracking system. These activities however mainly benefit larger (international) traders and companies. Indirect price effects could result, but there is no evidence for this. Other modules of the project were specifically focused at small traders and farmers. According to project staff and beneficiaries there are no custom costs for small traders if they register. The new border posts also reportedly increased the number of recorded passes of small traders¹⁶³. The project has not reported much on effects for small traders, making it more difficult to draw conclusions. Overall, regional trade has increased. Export for the whole EAC region increased with 6.6% while an intraregional increase in export of 25% has been reported. It is not possible to directly link this increase to the Intra-regional trade project.

 $^{^{\}rm 161}$ Average reduction in customs clearance time from 3 to 1.5 days (June 2015) and reduction in cargo transit time from 8 days to 2 days

¹⁶² For example maize and rice which are imported and exported according to demand and availability in bordering countries.

¹⁶³ Side visit Busia, meeting with border staff, Field visit 2016.

Intra-regional trade also contributes to output 3.1 'Public functions improved'. The project is responsible for more efficient border posts, which are operated by public officials, and a decrease in time that is needed for cross-border trade checks. However, border staff did mention that de cooperation under the single border system is not entirely working as intended, mainly on the IT system. The project is also responsible for the creation of export certification of standards for 23 food products under the Bureau of standards. According to project staff the Bureau of standards has shown commitment to carry forward the improvements, even further reducing transport times from 8 to 7 days.

3.6.3.3. 23614 KAM support fund

The KAM support fund is intended as an enabling project which allows EKN to ty the projects in the portfolio together, to continually asses the agricultural sector and opportunities for development and investments, and to promote farming as a business as well as cooperation with Dutch businesses and stakeholders.

| Objectives | Outputs | Outcomes | Conclusions |
|--|--|---|---|
| The activity aggregates the KAM- support to the preparation, | Outputs according to project reports and staff interviews: | Outcomes according to project reports and staff interviews: | The Fund has resulted in at least 18 sub-projects in the form of studies, trips and guides. This has |
| facilitation, monitoring and review of projects and brokering events in the area of food security as identified in the MASP. | 18 seperate projects and studies have been supported. Several market scans to understand subsectors and investment opportunities | The project has contributed to making farming more popular with younger people and to show the potential of intensified agriculture. More Dutch agro- | helped EKN and partners and investors gain a better understanding of the Ugandan agricultural sector and its subsectors, as well as identify where the opportunities for investment lie. |
| | Feasible options identified for FS portflio projects Activities to sensitize and mobilize Dutch Private sector for | companies are aware of the possibities of doing business in Uganda. Several value chain opportunities and partnerships have been | The KAM support fund led to a more integrated portfolio in which projects were aligned with EKN's vision. |
| | trade & investment in Uganda New inputs introduced into Uganda, e.g. seeds, potato varieties and processing tools/techniques Best farmer | realized as a result. | The KAM Support Fund is used to support several initiatives to food security, and the outputs often relate to quality inputs. Yet the strategy appears to be more down to arising opportunities and needs a less holistic |
| | competition broadcasted nationally, regular newsarticles. | | approach. |

Table 30 – KAM Support Fund outputs, outcomes and conclusions

| Level of food security improvement | 23614 – KAM Support Fund |
|---|---|
| Food security objective? | The KAM Support Fund is used to support several initiatives to food security, and the outputs often relate to quality farm inputs. |
| Number of direct beneficiaries, and targeting food insecure? | Estimated 4,363 farmers directly reached. ¹⁶⁴ Not food insecure: Promising farmers (dairy/livestock/potato) brought in contact with Dutch agro-businesses. |
| Targeted stakeholders | Large number of internationally oriented Dutch agro businesses: identifying investment opportunities and supported in entering the market. Exact numbers not known. |

¹⁶⁴ The exact number of beneficiaries of the whole project is not accurately reported.

| Indirect food security | Too little evidence. Supported assumptions: |
|------------------------|--|
| effects | - Some agro-business partnerships supported with high productivity potential. |
| (likely/evidence) | Knowledge exchange to a small number of farmers, stimulating intensification |
| (interj/evidence) | Introducing non-input to a share number of far metrics, stimulating metrismethol. |
| | - Introducing new inputs and new varieties (e.g. 23 potato varieties). |
| Other projects enabled | Yes. |
| | - aBi-Trust applied insights from the livestock market study for investment in |
| | cooling systems in dairy. |
| | - The introduction of new potato varieties provides CATALIST with new inputs |
| | PASIC mid term review led to more result oriented and effective project |
| | - TABLE induction review led to more result-oriented and elective project |
| ~ | |
| Institutional effect | - Policy frameworks were not directly targeted. |
| | - Cooperate with Ugandan Investment Authority to promote Uganda in the |
| | Netherlands. |
| Other bottlenecks | To some degree. The Best Farmers Competition has promoted 'farming as business', |
| addressed | changing (young) people's attitudes and willingness to start farming. |
| | Market scans created a better knowledge base, which reduces uncertainty of |
| | investment |
| Private sector | Ves New agri-chain cooperations: Dutch potato value chain actors introduced to |
| dovelopment | Isondo market |
| (likely/ovidence) | Usahanda harket. |
| (likely/evidence) | - Netherlands have dedicated desk in Ogandan investment authority (UIA). |
| | Effect not known. |
| Other (Policy Letter | The project is in line with the second goal of the policy letter as it aims to attract |
| 2014 and MASP 2014- | more foreign investment. |
| 2017) | |
| | |

Table 31 – KAM Support Fund and food security indicators

Conclusion:

KAM support fund contributes to output 3 'More Dutch trade and investment'. Both within Uganda and within the Netherlands the project has to some extend created awareness of the opportunities and the benefits of cooperation and investment in the agro-sector in Uganda. The Netherlands is generally perceived as one of the most important partners with regard to agriculture. The project has contributed to this perception. Some concrete successes have been realized of partnerships and introduction of Dutch machinery or agro-inputs. Moreover, this objective has also been promoted with the projects in the portfolio. For the projects it was however challenging to find partnerships with Dutch business. More support from the EKN to this regard was expected by several project implementers¹⁶⁵. Because most effects of this project are less tangible, it is difficult to determine effectiveness.

3.6.4. Effectiveness of policy enabling projects

We now present the results for the projects that did not directly target the rural population. In assessing the effectiveness of these projects, more emphasis is placed on impact on other stakeholders and less on beneficiaries and food security effects. For these projects we also consider the following indicators that are relevant to evaluate the success of these projects: (1) Other projects enabled, (2) Institutional effects and (3) Other bottlenecks addressed.

3.6.4.1. 23620 Agri-policy action – PASIC

The project Policy action for the intensification of the Agri sector (PASIC) aims to set the political agenda of the Ministry of Agriculture to foster an enabling environment for intensification in agriculture. PASIC uses an evidence-based approach and focusses on the key value chains (including potatoes and rice) and inputs including fertilizers and seeds.

¹⁶⁵ At least CATALIST and Agri-Skills noted this, who were also most directly engaged in value chain integration.

| Objectives Outputs | Auteomos Conclusions |
|--|---|
| ObjectivesOutputsIntensification of agricultural production in Uganda through research and by strengthening capacities of relevant institutions.Outputs according to project reports and sta interview:-Crop intensificati studies realized fo potatoes and rice-Advocated removi of bottlenecks for seed policy and extension policy (fertilizer) in nation policies relevant to agricultural intensification-Statisticians and advocacy workers trained with MAA and stakeholders Numbers not ad- hand with staff (target: 40 people-Convened 12 mul stakeholder meetings, in which bottlenecks to po processes were identified-Needs assessment exercise within MAAIF has been executed. | OutcomesConclusionsOutcomes according to project reports and staff interview:PASIC has so far been able to accomplish some but not all outputs. There are some initial outcomes flowing from PASIC's efforts but these are less controllable.In several occasions government officialsefforts but these are less controllable.In several occasions government officialsefforts but these are less controllable.In several occasions government officialsThe project has been effective in the identification of key bottlenecks, the project is only now starting to develop zonal investment plans and further capacity building.IFDistricts influenced through use of findings in district reports. Contributed to by-laws.PASIC has gone through a transformation after the MTR and partly shifted its approach. Effects from the new outreach/promotion approach are not visible yet.IfDistricts influenced through use of findings in district reports. Contributed to by-laws.PASIC has gone through a transformation after the MTR and partly shifted its approach are not visible yet.ItNot working with the right combination of officials (senior and junior) has reduced effectiveness at the start.**ItNevertheless, PASIC is seen by the MAAIF as a valuable takeholder and partner and provides a valuable connection for |

| Level of food security improvement | – 23620 Agricultural Policy Action |
|--|---|
| Food security objective? | Indirectly, The project focuses on strengthening the regulatory framework for agricultural intensification, specifically the MAAIF, to stimulate action in selected policies and programmes, relevant for agricultural production systems of (smallholder) farmers. |
| Targeted stakeholders | 249 stakeholders linked: MAAIF, local government institutions, local stakeholders and farmers engaged. ¹⁶⁸ |
| Indirect food security effects (likely/evidence) | Almost no effect. Effective lobbying for implementation of policies has a potential for real effect for farmers (e.g. policies making counterfeit seeds unlawful (if effectively enforced) may lead to less failed harvests). |
| Other projects enabled | Yes, to some degree. Direct facilitation of ISSD in advocating seed policy at different policy levels. |

¹⁶⁶ End line interview.
¹⁶⁷ MTR and interview with EKN.
¹⁶⁸ See stakeholder maps with engaged stakeholders.

| | - Field-level study for CATALIST on chances and bottlenecks for intensification. |
|--|---|
| Institutional effects | Limited. Seed policy in the process of being approved at national level. Contributed to by-laws and strategic documents at district level. |
| Other bottlenecks addressed | Limited. Multi-stakeholder meetings, giving voice to other organizations and stakeholders to influence policies, enhancing accountability. |
| Private sector development (likely/evidence) | Limited. Assumption: The promoted policies support commercial farmers and support access of foreign producers of inputs (e.g. fertilizers/seeds) to Uganda. |
| Other (Policy Letter 2014 and MASP 2014- 2017) | Aligned with MASP 2014-2017 goal of improving public functions, particularly the MAAIF. The development of zonal investment plans for potato and rice areas is explicitly mentioned. Aligned with policy letter on Participatory approach, by developing multistakeholder consultancies. |

Table 33 - PASIC and food security indicators

Conclusions:

With regard to output 2.b, while it has been recognized that influencing policies is a sensitive and difficult field, according to EKN¹⁶⁹ the MAAIF has stated its appreciation of the work of PASIC. Direct contributions to improvement of public functions include training of several officials and lobbying for better policies, based on participatory approaches. Outcomes were less extensive than anticipated and difficult to attribute. With regard to output 3.2 'Regulatory framework enhanced', PASIC has according to project staff been able to use its research to support district governments, also by providing input to district planning reports, and central government policy making, for example with the seed policy. However, a structured strategy seemed to be lacking, which made outputs rather adhoc. With regard to output 3.3, 'Conducive research', the project provided input to other food security projects such as CATALIST and ISSD with its field level studies. The research included many farmers and other stakeholders and was supported with multi-stakeholder meetings to recognize bottlenecks and desired changes. As such, in practice research was used to engage farmers, cooperatives, interest groups in consultation and the policy process, thereby enhancing the public functioning. The lack of strategy and focus earlier in the project hampered the overall results. For example, the initiation of Zonal investment plans was still pending at the time of the end line evaluation because other activities had to first be finalized.

3.6.4.2. 23473 Operationalization Development Strategy Investment Plan (DSIP)

This project is initiated by the World Bank and targets the enhancement of the policy framework for the agricultural sector. The project consisted of support to the Ministry of Agriculture Animal Industry and Fisheries (MAAIF) in making detailed assessments of the key sectors for the Ugandan agricultural sector's development and opportunities for investment. The project also functioned as a baseline for the further development of the EKN's FS portfolio.

¹⁶⁹ Endline interview wrap-up visit 2016.

| Objectives | Outputs | Outcomes | Conclusions |
|---------------------------|-------------------------------------|---------------------------|-----------------------------|
| 1. To support MAAIF in | Outputs according to | Outputs according to | The project has finished |
| the operationalization | project reports and | project reports and staff | and outputs have been |
| of nine thematic areas | staff interview: | interview: | delivered as planned on a |
| of the DSIP, more | | | lower budget. Outcomes |
| specifically the nine | 23 Framework | MAAIE domonstrated | have not materialized as |
| plans for nine so-called | Implementation | MAAIF demonstrated | intended. The ATAAS plans |
| non-ATAAS areas. | Plans (FIPs) were | policy framowork | are in progress, while the |
| ATAAS stands for | developed ¹⁷⁰ | policy framework. | 20 NON-ATAAS were not. |
| Agricultural | - 12 investment / | Two donors, The EU | The 12 five-year investment |
| Technology and | - is investment/ | and the Worldbank, | plans have only led to two |
| Agribusiness Advisory | developed | have based their | investments of |
| Services (ATAAS). | uevelopeu | projects around seven of | development partners one |
| 2. a programme will be | specific market | the investment plans. | of which from the project |
| planned and executed | studies were | The government has | implementer itself. It has |
| to strengthen the | concluded to | used the studies to | not resulted in significant |
| institutional capacity of | inform the | create more focus in its | private sector investments. |
| MAAIF and in | preparation of the | policy: The 5-annual | P |
| particular the fiduciary | Agricultre Cluster | Agricultural Sector | The project has been |
| capacity of the | Development | Strategy Plan builds on | realized in cooperation |
| Ministry. This will | Project. | the outputs. | with the ministry and has |
| contribute towards the | - Engagements with | | been taken up in internal |
| creation of a long-term | government | Cooperation between | consists building has been |
| institutional | officials to co- | the implementing | limited |
| framework within the | create and inform | development partners | mmteu. |
| Ministry that can | on policy | and the MAAIF have | |
| continue to reinvent | processes. | improved. | |

Table 34 - Operationalization DSIP outputs, outcomes and conclusions

| Level of food security improvement | – 23743 Operationalization DSIP |
|--|--|
| Food security objective? | Enhance the institutional environment and integrate efforts of all stakeholders for strengthening the agricultural sector. Reduction of food security will only indirectly follow. |
| Targeted stakeholders | MAAIF staff has received some training and was engaged in the task teams. Outreach to development partners and private investors based on the investment plans. This did not lead to much cooperations and investments. |
| Indirect food security effects (likely/evidence) | Too little evidence. Supported assumption: Studies recognize opportunities for intensification and higher production. E.g. Investment plans used by World Bank to support 450.000 farmer have been been been been been been been be |
| Other projects enabled | Limited. Studies used by the EKN in KAM Support Fund to recognize priority areas. |
| Institutional effects | Likely. Studies an investment plans align MAAIF with other stakeholders MAAIF has solid and practical framework to determine its own investments |
| Other bottlenecks addressed | No evidence |
| Private sector development (likely/evidence) | No effect. The reports were supposed to catalyse private sector investments. No investments were reported. At best reports were used to take stock of opportunities. |
| Other (Policy Letter 2014 and MASP 2014- 2017) | According to the second goal of the policy letter in order to create a competitive and well-functioning agri-sector, strong and qualitative policies are important. |

Table 35 - Operationalization DSIP and food security indicators

Conclusions:

itself for future needs.

The project primarily contributed to output 3.2 and 3.3. The DSIP strategy for agricultural development of the MAAIF was very broad and the operationalization has created detailed analyses of

¹⁷⁰ Baseline report.

the country context and of high-impact opportunities. The investment plans have not led to comprehensive adoption into the regulatory framework of the MAAIF. However, they have been used to inform the subsequent longer term strategies of MAAIF. It is not clear how significant this has been. Due to the limited capacity of the MAAIF, limited activities for capacity building in the project and relatively limited co-creation, the improved regulatory framework has not greatly transformed policy practice. Moreover, the levels of investment to put the framework to use have fallen short. The risk exists that the operationalized frameworks are soon outdated and will have been underused. This might also be because a very large number of studies have been carried out, making it too broad.

One of the objectives of DSIP was to catalyse more business investment, from local investors, foreign investors and partner organisations. The EKN has endeavoured to provide research opportunities to Dutch institutions for the consultancy work for the operationalization of the DISP. To some extend this has been realized. The use of investment plans by Dutch investors has however not materialized. To that regard the project has not been successful in enticing businesses to use the investment plans for investments. The main investments have come from the initiator of the programme, the World Bank.

Synthesis of effectiveness on project level

The following table summarises the findings on food security effects from the assessment of each project. The direct and indirect food security effects have been ranked between very low and very high, with very low meaning that there have been almost no effects on food security while very high meaning that there were strong effects on food security. Depending on the level of supporting evidence 'likely' has been added if there was only little supporting evidence and no evidence if there was no evidence.

| Project | FS objective | Benefi- ciaries | Food Availability | Food access | Food stability | Food Utilisat ion | PSD |
|--------------------------------|-----------------|--------------------|----------------------|----------------|-------------------|-------------------------|----------|
| CATALIST | Explicit | 70,000 | Highly | Likely | Likely | - | Several |
| ISSD | Explicit | 55,000 | Highly | Likely | No evidence | Likely | Likely |
| Agri-Skills | Explicit | 12,250 | Likely | Likely | Likely | - | Likely |
| aBi-Trust | Explicit | 10.000 | Limited | Some | Some | Likely | Likely |
| Intraregion al Trade | Implicit | 20,000 | No evidence | Some | No evidence | - | Highly |
| Financial inclusion | Implicit | 36,000 | - | No evidence | No evidence | Not directly | Several |
| KAM Support | Indirect | 4,000 | No evidence | Several | Likely | Some | Several |
| Operational ization DSIP | Indirect | N.A. | No evidence | Low | Likely | No evidence | Very low |
| PASIC | Indirect | N.A. | Very low | Some | Low | Low | Very low |

Table 36 – Synthesis of portfolio food security effects

3.6.5. Contribution analysis

"To what extent have the project pathway, alternative pathways, or other factors contributed to changes observed?"

In this section we will discuss to what extent the observed changes and effects recognized in the previous section can be attributed to the projects. Where relevant, the influence of alternative pathways and other factors is discussed.

3.6.5.1. CATALIST

The project intended to increase production and income of farmers through improvements in inputs, skills and value chain integration. The studies done by CATALIST suggest higher income and higher yields of participants. Although results vary over the years, the project has likely contributed to this improvement. However, the degree to which this directly results from the project is unclear. The fact that half-way through the project farmers in the programme increased income with 100% and the control group increased income with 70% demonstrate that there are other factors at play in the realization of income increases. From the progress report 2015 it becomes clear that this varies per crop: income on cassava has decreased for non-participating farmers in 2015 while income on soy bean has increased¹⁷¹. However since this research was carried out by the Catalyst project team and it is not clear how the control group was determined and how the data were gathered, it does not present a convincing conclusion on the project's impact. It might therefore be the case that without the project, an income increase of 70% for some crops might have occurred over the same period. Better access to markets and reduction in trade costs can be attributed to the road construction works in this project. The actual extend of these benefits is not known.

3.6.5.2. ISSD

The beneficiaries of Agro-seeds have become seed producers, and according to project reports producers generally have increased their incomes. The farmers buying the seeds have reported higher yields which is also shown by the project's test fields. Little data is available to support the assertion that farmers within the project have increased their yields more than other farmers. The share of seeds being bought by farmers directly, has increased. While the project engages in sensitization to create market demand for seeds, it is not clear whether this is the reason for the increased demand and willingness to pay. Either how, the fact that demand is increasing demonstrates the success of the project in realizing higher incomes for farmers. Better access to seeds for the reached rural population largely results from the project. The role of government and other NGO's in buying seeds should not be overlooked. It is unclear what share of demand comes from these institutions, but it is clear that without their role in the demand side (especially in the first years), the income effects for seed producers would have been lower.

3.6.5.3. Agri-Skills 4 You

At least a part of the participants who have been trained in agricultural practices through Agri-skills has enhanced their competitiveness. Enhanced agricultural skills and inputs, marketing skills and increased confidence have likely contributed to this. Agri-skills has had an important role in facilitating the access to these resources. On the other hand, many participants were not able to find a job after participating. There are clearly also other factors influencing the livelihood improvements of participants. Agri-skills has captured a large number of success stories of people who have started producing higher valued crops, who increased production and have been able to sell them to the markets.¹⁷² As most people also consume from their own production, this is a logical direct improvement of their food security status. It can be concluded that at least a part of the employment of participants results from the project.

3.6.5.4. Intra-regional trade

The project pathway suggests that lower trade costs and economic regional integration lead to better processing (e.g. distribution) of, amongst others, agricultural products. Economic cooperation with international companies has increased over the years, and the reduction of trade restrictions has likely contributed to this process. However, since the project has only recently been finalized the role of the project in the perceived increase in intra-regional trade should not be overstated. The number of small traders that use the borders has demonstrably increased. The promotion of cross-border trading and enhanced border facilities have likely had a large role in this. This does not, however, mean that cross-border trading has increased, but could also suggest that less illegal trading is done and registers are better kept. Another reported factor outside the project scope is the increased demand from across the

¹⁷¹ Progress report 2015, p. 8 Table 1

 $^{^{\}scriptscriptstyle 172}$ See annual report 2014 and annual report 2015.

border (this is especially the case in Kenya and South Sudan). The 'Doing business in Uganda' status has improved, but the effect of the project in this regard cannot easily be determined. It is also not (yet) clear to what degree this has stimulated international businesses to do business in Uganda. Especially for the larger businesses that regularly trade across borders using the operational border posts, significant cost reductions are being realized as a result of the more efficient border controls. It can only be assumed that this translates into more (or better paid) labour and lower food prices.

3.6.5.5. Agro-finance

In the financial inclusion project it is anticipated that a large number of rural inhabitants will receive access to finance, and that this will enable farmers to intensify production and other actors in the agro value chain to expand their operations. The number of users of financial products in rural areas has increased over recent years. While the strengthened capacity of DFCU and targeting of farmers and agri-business has to some degree contributed to this, it has so far only reached a limited number of farmers. DFCU aims to build capacity of farmers in financial literacy, but the extent to which this has been realized is very limited. According to their own sources, many of the farmer groups that also received loans realised higher increases in production and income. According to their development partner the loan has played an important role in this.¹⁷³ Due to a lack of available data this cannot be determined. The fact that there is, so far, less interest in the financial products from farmers than anticipated, also due to high interest rates, suggests that the benefits to income and food security are perceived to be limited.

3.6.5.6. KAM Support Fund

Through KAM support fund EKN targeted private sector engagement in Uganda. The KAM support fund has made a contribution to create awareness among Dutch companies on the opportunities of doing business in Uganda. Not many concrete cooperations have materialized from this. According to the EKN, Uganda is not a country many Dutch businesses consider for doing business. It is therefore likely that the active promotion of the EKN has significantly contributed to the business activities and partnerships that have materialized. Some economic cooperations were started between Dutch and Ugandan agri-businesses. It cannot be excluded that these would also have happened without the activities of the EKN under the KAM Support Fund.

Furthermore, the attitude of the population towards farming was targeted by the project, and with apparent successful effects. A more positive attitude is an important precondition for an effective agricultural sector and food security enhancement. EKN has contributed to this by setting up an initiative, which turned into a popular TV show, and by stimulating other projects to make 'farming as a business' more prominent in their training. A change in attitude of the population has not been tested in this evaluation. There are of course also many other factors that influence this.

3.6.5.7. Operationalization DSIP

The government is using the operationalization DSIP to develop their subsequent 5 year agricultural action plan. It is however not clear to what degree these reports are actually used and there are many other factors that influence the MAAIF's policies. To some degree the reports have been used to catalyse investment (mainly by the project implementer itself), but this is very limited and seemed to have followed from other factors rather than the reports. Rather than the studies catalysing the investment it appears that the reports formed the inception phase of the food security project later initiated by the project implementer. According to EKN and the DSIP, the studies were of a high quality and the MAAIF was engaged in the process. Through this cooperation itself it appears the MAAIF was somewhat strengthened. The boards to which they were a member were only constituted for the report development and the build capacity under the project therefore did not have a structural nature. The project staff admitted that the studies were probably too broad and a focus on lesser topics would have been more effective.

¹⁷³ Interview with development partner, Technoserve, field visit end line 2016.

3.6.5.8. PASIC

For the PASIC project it is especially difficult to attribute effects to the project. It is clear that the project has made contributions to the awareness of the government for intensification of agriculture. Specific fields of research and advocacy were selected by PASIC. While very limited outcomes were reported, these can partly be contributed to PASIC. With regard to the seed policy, PASIC has played a role in creating more awareness and informing decision makers on the proposed policy. According to the EKN the expertise of PASIC was acknowledged by the government, also in the interviews it showed that other project implementers highly valued the PASIC project. PASIC commented that the influence of their activities should be indirect. In the decision making process politicians should themselves be committed to the proposed policy change. This makes it even more difficult to assess whether PASIC has had an influence. For example, according to PASIC the call of the minister in parliament to remove import restrictions for international fertilizer suppliers resulted from their activities. This cannot be ascertained and because of the difficulty experienced by the project to reach the right policy offers the impact through this pathway is limited.

3.6.6. Evidence that food insecure people have been reached

What is the evidence that food insecure people have been reached, directly or indirectly?

To determine whether food insecure people have been reached, we primarily rely on the documented data on the food security situation from the project reports. Additionally, the qualitative information from the evaluation visit provides some more detail to illustrate the changes in the food security situation for individual participants. The field visit data, the reported data and the country context information (Ch.2) together enable us to make some careful assertions about the wider improvements in food security from the projects. These findings of course do not constitute a statistically representative sample. It does however provide some understanding on whether and how (many) food insecure people have been reached in the program.

3.6.6.1. Evidence from project information

The value chain projects and the market enabling projects operated mainly in rural areas. Because of the large share of the total population that is food insecure (see Chapter 2) especially in the rural areas targeted (North and East Uganda), and considering the fact that small-holder farmers and people with a lower income are more likely to enter the projects, it is asserted that the projects include a significant amount of participants and beneficiaries who were in some way food insecure.

Moreover, a number of the projects inadvertently reach food insecure people (as well as those who are food secure). These include CATALIST and Intraregional Trade, both projects that constructed roads and also border posts in the latter case. These are facilities that are publically available and therefore benefit the entire local population, including the food insecure. It is not possible to provide estimates on the number of users.

CATALIST and ISSD primarily targeted farmers with varying degrees of commercial activities, for which it is difficult to determine the food security level but given their demographics (remote, rural, and agricultural occupation) likely include food insecure people. At the same time it is important to point out that these might not have been the most food insecure people. That is because CATALIST targeted existing farmers with commercial potential, which might lead to the exclusion of food insecure subsistence farmers that do not meet this criteria. Agri-skills targeted students (often without many alternative opportunities) and small-holder farmers, in the northern region of Uganda (one of the most food insecure regions). This suggests that at least for Agri-skills potentially a large group of participants were food insecure.

3.6.6.2. Evidence from the evaluation visit and Focus Group Discussions

Based on the project information it can thus be asserted that food insecure people have been reached. The qualitative information gathered during the field visit and from the Focus Group Discussions supports this finding. To provide insight into the process through which some of the participants benefited we present some of the information received during the FGDs. While these findings cannot

be generalized for the entire population, it does provide insight into the mechanisms through which the projects contributed to food security improvement.

Agri-skills

For the Agri-skills project two FGDs were held. One FGD included students and the other farmers, at least part of whom had low incomes and had experienced forms of food insecurity. This is also clear from the survey taken before the FGD, for which only 6 out of 12 students had sufficient food for the household before 2012, while 12 out of 12 responded having enough food for the household nowadays.

All participants mentioned an increase in production and in income as a result of the project. However, most of the extra income is spent on education, only after which comes food. On the question how they received most of their food before 2012, 7 out of 12 students answered from family, and only one answered own production, while nowadays 7 out of 12 get most food from their own production. This illustrates that for these participants the increased production led to both more consumption and extra income. During the discussion participants unanimously mentioned that the increased production is primarily sold. The following responses give an indication of the effects of the project on their level of food insecurity.

Male graduate: 'My income has increased over the last 4 years. Now I have graduated as a student I know how to cultivate crops, on a daily basis and to sell the produce regularly to the market. Now that I have changed my production to producing horticulture, this has improved my incomes. Previously I had less wealth, but as a result of the new products that I am selling, because there is more demand for these horticulture crops, I am doing better.'

Female graduate: 'In the past, I used to plant on a large acreage of land, but still did not earn enough money. Now with a better understanding of farming and knowledge on planting, I plant one lot and get one million shilling. I am able to keep my family very well now.'

Male graduate: 'In the past people did not know much about animal farming, but many students have been thought how to do this and they have received the means to start for themselves. This is important because meat is the most valuable food in the world. People need meat. Therefore this type of farming adds value and increases income.'

The farmers we visited for Agri-skills lived in a small village and were now working as an organized farmers group, linked to a bulk buyer through Agri-skills. During the discussion several members noted having experienced food shortages before and most had been subsistence farmers.

All the participants except one¹⁷⁴ noted having increased their production, mainly due to use of fertilizers, pesticides, use of oxen and sowing in rows. They also claimed their income had increased. This was due to higher prices, more different crops produced, and a larger land cultivated. The money is primarily used for education, and secondly to buy food. The farmers buy what they do not produce, and most importantly it is used to buy meat. Other products include brown rice and sauce.

Female participant: 'In farming we used to apply techniques that were less effective, such as hand digging with a hoe. It was possible for food [stack] to finish while the production cycle had not ended yet. This has changed and for my children I can now pay for them to go into university. We used to grow to eat but now we are growing for business and know this is possible. We have enough for home consumption, while four years ago it was not enough.'

Male participants: 'We are doing very well now we are linked to the market and received knowledge from the agri-skills training. Since then I was in a position to buy a motorcycle, to buy land in town.' Female participant: 'I have used it to buy a mobile phone and I am now owning an oxen.'

Intra-regional trade

The border post that was visited on the Uganda-Kenya border, Busia, is used by trucks as well as small traders and small-holder farmers. A large part of these is likely to be food insecure in some respect,

¹⁷⁴ Because of too much sun her plants had been ruined. In previous years her production was good, and she was able to invest in a motorcycle.

considering the rural setting in which the project takes place and the relevance of the border posts to small (informal) traders.¹⁷⁵In the survey prior to the FGD, 10 out of 12 participants stated that they did not have sufficient food for their households before 2012 and 8 out of 12 noted they did not have sufficient food nowadays.

The FGD participants were mostly traders and women traders involved in intraregional trade, mostly from Uganda to Kenya. They mainly traded in food stuff including beans, fish, rice, cereals, millet but also other products such as timber and used clothes. According to the respondents food is mainly exported to Kenya, while manufactured goods are imported into Uganda.

In the FGD for Intra-regional trade most participants noted an increased income. In addition, they also mentioned increased cross-border trade activities, and some partly ascribed this to the reduced trade costs. Similar to Agri-skills, participants also spent their increased income principally on the education of children and secondly on food. This shows that even though most participants currently feel like they do not have enough food for the household, most likely belonging to the category 'moderately food insecure' described in chapter 2, increasing the current level of consumption is not the highest priority.

Male trader: As a result of the border changes I can now more easily go to Uganda to buy timber and then bring the timber to Kenya. There is a bigger market for it there.

Female trader: I am trading from Uganda to Kenya. While in Kenya there is more demand, people there don't want to go themselves to buy the products. My profit in trading has increased because costs in customs are very low.

Male trader: Customs costs have been reduced, especially for traders in cereals. This is one reason why I am now trading more and a reason why I have a better income.

Female trader: I have benefited from the trade information desk officer, as they help you to see how much you can profit and on how to reduce costs.

Female trader: We do not have materials to pack the food and asked them to assist us. We are used to put them in long sacs and the suggestion they had for packaging, we cannot afford.

Please see Annex G for a detailed report on the focus group discussions including a discussion on the methods used, the context and setting and the reliability of the findings.

3.6.7. Synthesis of effectiveness at programme level

Up to what level (institutional level outcome; household level outcome / proxy impact (food production, income, food prices, buffers), individual level outcome (food consumption, nutritional status)) has the food security improvement of targeted households been established?

In this section we synthesize the findings from section 3.6.2, to 3.6.7 on food security effectiveness and aggregate it to the programme level. For almost all projects food insecure people were not targeted and levels of food insecurity were not documented. As explained in 3.6.7 it is likely that at least a share of the beneficiaries experienced some form of food insecurity. The degree to which actual food security improvements to the targeted households can be determined is limited, but based on several (proxy-) indicators this analysis can still be made. Based on information presented in the previous sections we will synthesise the aggregate program food security effects at three levels:

- the institutional outcome;
- the household outcome;
- the individual food intake outcome.

¹⁷⁵ It is important to note that while small traders use the border on a daily basis, the main traffic using the border posts are larger commercial companies. Also, the border post staff directly benefit from the programme. Small informal traders might thus not be the main beneficiaries of the project, but are the ones most interesting when assessing food security effects.

Institutional level

On the institutional level, there is no convincing evidence yet that the Dutch food security projects have improved the food security situation of Uganda in general. The three institutional enabling projects Operationalization DSIP, KAM Support Fund and Agri Policy Action did not lead to direct, observable results benefiting food insecure households. Institutional changes that have been accomplished only indirectly lead to food security. For example, with regards to the cooperation between ISSD and Agri Policy Action, it is likely that households will benefit from a food security improvement in the future when the policy regarding counterfeit seeds has been implemented. Without the (illegal) sale of counterfeit seeds, harvests and thereby production will improve. However, mere regulation on these practices is not sufficient to be effective and requires enforcement. Because most institutional activities were not completed at the time of the evaluation and effects from institutional change are often not immediate, the actual food security impact from institutional outcomes appears to be low but cannot be ascertained. At the same time, the activities of these projects were very broad, and a stronger focus on a smaller amount of institutional changes could have led to more visible results.

Household level

On the household level food security improvements are visible from the projects. The household (proxy) food security effects are most apparent in the value chain projects: Agri-skills, CATALIST-Uganda, and ISSD. An increase in food production can be noted, although the extent of the increase is uncertain. In the ISSD project, the yield of farmers growing mainly food crops using the quality seed produced by the ISSD supported farmer groups improved by 30%. In the CATALIST and Agri-skills projects food production also increased. According to CATALIST-Uganda, productivity of potato increased from 2,753 Kgs per acre to 5,400 Kgs per acre; rice from 648 Kgs per acre 1,470 Kgs per acre. According to Agri-Skills, 96% of the families in the three sub regions of Acholi, Lango and West Nile reported an increase in their agricultural productivity¹⁷⁶. The reliability of this data cannot be determined. The numbers of CATALIST and ISSD are based on samples and therefore more reliable than the narrative information from Agri-skills. The available information thus indicates that overall productivity has increased. The increased food production has a direct effect on food security in terms of availability, thereby improving the food security situation of targeted households.

Secondly, the mentioned projects have an impact on the income of targeted households. For CATALIST-Uganda the reported per capita income grew by more than 100% among supported potato and rice farmers compared to a 71% growth for their non-supported counterparts. Targeted households in the ISSD project benefited from the shift from grain to seed production and selling, as this activity resulted in higher incomes. Significant income increases have been noted as a result of several projects. However, the projects did not report on spending and the level to which this actually enhanced food security.

Thirdly, while it has not been an explicit target of most projects, several projects contributed to food stability by strengthening household assets. The Financial Inclusion DFCU enabled saving of money, although so far only for a moderate number of rural households and farmers (groups). As discussed in Chapter 2, financial assets are considered important to cope with unforeseen setbacks for the household. The projects aimed at enhancing farming practice (Agriskills, CATALIST and ISSD), trained farmers in sustainable farm practices and provided inputs that could help prevent crop-loss due to weather conditions, pests etc. As this indicator was not specifically reported on, it is difficult to determine the level to which food stability improved overall.

Individual level

Assessing the impact on the targeted households in terms of food consumption and nutritional status is difficult. With an increased income it is likely that households are better able to buy more and other types of food that they do not produce themselves. However, personal food consumption was not directly targeted by the EKN, it has not been reported on in the documents and measuring this was not part of the portfolio evaluation. The impact on this level of food security is thus not clear¹⁷⁷. The

¹⁷⁶ Questionnaire, 2016

¹⁷⁷ For the in-depth Abi-Trust study this has been assessed, see ch.4

in-depth case studies show that for the interviewed participants dietary diversity generally increased. The small sample of respondents however does not allow conclusions to be drawn for the entire projects.

3.6.8. How have women benefited?

Women have been an important target group in the Dutch Development Cooperation policy as of the 1980s¹⁷⁸. They were explicitly mentioned in "A world to gain, A New Agenda for Aid, Trade and Investment" and also in the Food security policy letter 2014. Within the MASPs by the EKN, both the version of 2012-2015 and 2014-2017, women are also included. As noted in these policy documents and in Chapter 2, women are an important target group mainly because of they are more vulnerable to food insecurity. Gender inequality in access to resources (finance, knowledge, skills, land, livestock etc.) leads to women lagging behind in agricultural production and consequently food availability. This is particularly problematic because in many countries, including Uganda, women traditionally play an important role in agriculture and their potential contribution to food security is now underutilised. Additionally, women are often underrepresented and marginalized in agribusiness leadership positions. Strengthening their role and representation contributes to greater gender equality. For this reason EKN encouraged the portfolio projects to include women in their projects and adopt a gender sensitive approach. In general, the focus of the portfolio projects is on improving women's access to finance and agricultural knowledge and skills so as to improve female entrepreneurship in agriculture and improve their economic self-reliance and food security. Some of the projects also promote female leadership and the role of women in agribusiness (value chains). The extent to which projects have been able to do so and to report about it is varied.

From the project documents it can be concluded that only three projects have included women as an actor in the design of the project resulting into gender-specific indicators and targets. These are ISSD, Agri-skills and Financial Inclusion. During the project implementation the CATALIST and Intraregional Trade projects also started focusing and reporting on women. Based on our literature study (see Chapter 2), we have recognized several important factors for women inclusion and will here consider key benefits from the projects for women in this light.

ISSD has adopted an affirmative gender inclusion initiative, thereby intending to make efforts to effectively involve both men and women to contribute to productivity and equity in the agricultural sector. For example, in 2013 25% of the 5200 smallholder seed growers was women¹⁷⁹. Seed production is considered as potential commodity for female entrepreneurship as this will lead to higher income and, therefore, greater accessibility to food. Additionally, the role of women in agribusiness is strengthened. Women and men are equally represented in the Local Seeds Businesses (LSB) and in 90% of the LSBs gender representation was addressed with at least 30% women are in leadership positions¹⁸⁰. Other gender affirmative approaches have led to: initiation of women friendly innovations in savings; joint planning in households, change in attitude on women LSB leadership; and generally more peace in households as well as economic growth.

The Agri-skills project focused on training particularly youth and women agribusiness skills (TVET) to encourage them to engage in farming. Especially the most food insecure regions in Uganda were targeted, thereby aiming to contribute to food security for the most food insecure. In 2016, of the 2,771 youths (target 2000) that enrolled and acquired practical relevant agribusiness skills as a result of the project, 36% was female (slightly below the target of 40%). The annual report of 2015 shows 59% of farmers were women and the project staff noted that as much as 69% of all the participants in the project were women. According to these numbers the share of female farmers that have been trained is close to the target of 60%.¹⁸¹ According to the project implementer, the project also "mainstreamed"

¹⁷⁸ Brouwers, R. (2013). Revisiting gender mainstreaming in international development: Goodbye to an illusionary strategy. ISS Working Paper No. 556. P.7.

¹⁷⁹ Mid-term review 2013

¹⁸⁰ Annual report 2015. P. 10

¹⁸¹ Head-office interview, end line 2016.

gender disparities and provided equal opportunities for young men and women to generate income, reduce early marriages and Gender Based Violence"¹⁸².

Similar to Agri-skills and ISSD, CATALIST-Uganda has mainstreamed gender throughout the programme. Women constituted more than half of the participants in the programme, female leadership positions have increased, as well as more structural changes in communities and households. Of the 56,320 farmers trained in farming as business concept 40% were women and youth¹⁸³. Additionally, the project promoted gender responsive value chains. In 2015, more than 15% of the district Agribusiness clusters (ABCs) were being led by women and over 50% of the farmer group clusters have women in leadership positions most of which are female youth¹⁸⁴. Furthermore, the project sensitized (40% of the) farmers by providing gender mainstreaming trainings.

The Financial Inclusion project has a specific focus on improving financial inclusion for women and youth. By the end of 2015 3,500 women (out of 16,000 total people) were trained in financial literacy. In addition, the Women in Business programme was designed to support women entrepreneurs (with special focus on small and medium enterprises). 6,000 participants have been registered in the Women in Business programme and received training on doing business.

In interviews with project staff, women were frequently discussed as a target group that was difficult to reach but nevertheless perceived as important. The following activities to benefit women were discussed:

- For ISSD the main focus was on confidence building and teaching women skills they normally would not exercise in their traditional roles, for example negotiating. When gender related problems were encountered, specific solutions were sought. This led to innovative solutions that could then be used more broadly.
- CATALIST developed a pilot to focus on "women change agents", setting an example of best practice cases by connecting successful women to other women. Additionally, emphasize is given on accessible forms of mechanisation that enable women to save time and combine agriculture with care work.
- Agri-skills has addressed gender-specific needs, for example by adjusted timing and setting of trainings to make them more accessible for women and by providing dormitories. This was however not the case for all learning institutions. The institution that we visited was quite difficult to reach and did not contain sufficient spaces for all students to sleep. While classes were held in the evening to allow women to do their tasks during the daytime, travelling to a far off site at night-time is more risky, particularly for women.

Concluding, it is unfortunate that no attention to gender issues was paid within the current KAM Support Fund. Instead it was mainly used for promoting Dutch business, which is without doubt another important objective. However, some project implementers indicated that they would welcome a more detailed approach for this target group from EKN.

3.6.9. How have youth benefited?

Another very important target group within the MASP is youth. The involvement of youth is naturally crucial for the sustainable impact of the projects. Innovations and developments in agriculture can only continue when the next generation is also eager to take over and invest in this field of business. For the future of Uganda, with a continuous growth in population and a large young population, the involvement of youth in the production of food is of the utmost importance. Unfortunately involving youth in the business of agriculture is a challenging task in Uganda. During the interviews the main reason mentioned for this was that agriculture lost its popularity because it is perceived as hard work with little or no gain. Young people are more attracted to jobs in service delivery with higher gains and status, in that sense it is an issue of mind-set that is difficult to change within just a few years.

¹⁸² Survey 2016

¹⁸³ Annual Report 2015, p.25

¹⁸⁴ Annual Report 25, p.48

Furthermore the people of Agriskills also mentioned the role of the violent history of Uganda, some young people have been raised in refugee camps and lack knowledge and familiarity with agriculture.

This is also widely acknowledged by the projects, mainly by the directly implementing projects CATALIST, Agri-seed and Agri-Skills:

- CATALIST tries to attract young people by paying much attention to mechanization of land work. By putting emphasis on this issue and on new innovations in this field they try to convince young people of a reduced burden of agricultural work
- Agriskills was criticized in its midterm review for high drop-out rates for young people. In the interview they claimed that these percentages have now stabilized to approximately 4%. This was mainly because of recruitment of children with a problematic past instead of interested people. An outreach effect was accomplished of youth that had been trained in the first stage of the programmes and convinced people in their villages and families to also join.
- KAM fund yearly organised the Best Farmer of the year contest in which also youth is included. We have been informed by EKN that this is a very popular contest that receives nation-wide publicity. This also increases the popularity of agriculture among youngsters.

3.7. Sustainability of the programme

As the projects are initially funded for a specific period and most projects will end in 2016, the sustainability of the project achievements after the projects has ended is important for a lasting impact. In some cases the project implementers intend to continue the project by finding more funding. For these projects the sustainability will also be considered. The sustainability analysis indicates how successful the projects have actually been at recognizing a real need and developing an intervention that contributes to robust improvements that, in the best case, are incorporated into society. The most important findings on sustainability of each project are discussed. For each project some dimensions will be more relevant then others depending on the project logic and stakeholders engaged.

3.7.1. CATALIST

For CATALIST the most relevant sustainability aspects are socio-economic, environmental and financial.

CATALIST focuses on the value chain integration of smallholder farmers. After the Mid Term Review, CATALIST shifted from taking capacity building as point of departure towards seeking linkages with lead-businesses as a starting point to value chain integration. Thereby demand becomes leading, which can be considered more sustainable. On a farmer level training in 'farming as a business' has become a focal point. Instead of capacitating more farmers, a lower number of farmers is trained more intensively and trained in marketing skills.

For capacitated farmers to be able to continue farming after the projects have finished, sustainable use of resources as well as capacity to cope with climate change are required. The CATALIST-Uganda project activities take on a sustainable climate smart approach. CATALIST focuses on creating higher yields for small-holder farmers by improving their agro-inputs, as well as sustainable commercialization of smallholder agriculture (market development). At the beginning of the project soil mapping has been carried out to determine the fertility of the soil. Activities anticipating climate change include: water management (e.g. establishing of irrigation systems), investigating slow releasing fertilizer blends, and drought resistant seed varieties. Besides, farmers are also monitored to see whether they are adopting the trained methods.

For CATALIST, after construction, the roads become the responsibility of the district government. Financial resources of these institutions are limited and it is not clear how well they will be able to maintain the roads. Closer cooperation with the government and other stakeholders could have been considered to ensure more ownership.

3.7.2. ISSD

For ISSD the main forms of sustainability to assess are the institutional, socio-economic and to some degree environmental.

The project ISSD focuses on building the capacity of institutions related to food security. With regard to the ISSD project, smallholder seed growers were organised in Local Seed Businesses (LSBs). Although this type of organisation is not completely new to Uganda, it is an innovative approach. The fact that the LSBs are formed around existing farmer groups or cooperatives contributes to the institutional sustainability. The initial 30 LSBs that were capacitated by the implementing organisation itself in the first 2 years have reached a high level of autonomy. Furthermore, LSB associations are being set up to undertake shared activities and coordinate with the government institutions (ZARDI's). ISSD supported these local seed businesses in producing and marketing seed as opposed to grain, increasing their income.

The improved seeds benefit the agricultural value chain and farmers who are able to purchase quality seeds as a result of the project. This suggests that it could be a commercially functioning part of the value chain. However, until now a large share of the production of the LSBs has been purchased either by government institutions or NGOs distributing the seeds to farmers for free. The termination of the government project in 2014 led to a fall in demand. The same could happen when other NGO projects are terminated. The project staff recognizes this, and notes that between the second year and this year the share of seeds bought by farmers increased from 10% to 30%. The last phase of the project will thus be dedicated to sensitization of farmers on the use of quality seeds.

Environmental is integrated into the agro-seed project. ISSD aims for distribution of diversified seeds suiting different weather conditions. Applying the right type of seeds and inputs will become increasingly important as vulnerability of agricultural production increases due to more hazardous climate effects. It is not known whether farmers are educated in the different seed types.

3.7.3. Agri-Skills 4 You

The most relevant sustainability criteria are institutional, socio-economic and to some degree environmental.

Agriskills 4 You focuses on building the capacity of institutions related to food security. In the case of Agriskills Vocational Training Institutions (VTIs) and BTVET training centres are strengthened. This training approach allows for a better training of youth and farmers and thereby an improvement in agricultural productivity and food security. The fact that the project operated through existing institutions contributes to the sustainability of the approach. Most of the schools did not teach an agricultural curriculum before the project¹⁸⁵. This could indicate that there was not sufficient demand and that it might therefore not be sustainable. However, the project has demonstrated that interest in the courses has gradually increased over the course of the project. Once graduated students started earning incomes based on their new skills, this triggered the interest of others. In some institutions students pay part of the fee. A part of the products produced by the student during the course is paid to the institution, which makes it more sustainable. The fact that there is no coordination between institutions in the form of a regional board¹⁸⁶ can decrease the sustainability of the project as the VTI's and BTVET's will then rely on their individual capacities. With regard to the management of the institutions, the regional staff noted that this is one of the most worrisome issues because there is generally a lack of capable management, who are often also self-interested. Part of the sustainability plan of Agri-skills is aimed at building the capacity of the management.¹⁸⁷

Agri-skills also applies a value chain approach. As with CATALIST project staff noted the difficulty in finding agri-businesses to develop sustainable relations with. There are cases in which they have linked farmer groups to agri-businesses. The formation of farming groups itself is often a pre-

¹⁸⁵ Interview Agri-skills head office, end line 2016

¹⁸⁶ This had been considered as part of the exit strategy, but did not take off. Source: Idem.

¹⁸⁷ Interview Agri-skills district office, end line 2016

condition for value chain integration. Agri-skills only facilitates the formation but leaves selection of partner-farmers to the farmers. This way only groups with a sincere will to cooperate are started. The decision of ICCO together with the EKN to release one of the implementing partners early in the program due to lack of focus on market integration shows this form of sustainability is leading. The education itself can be said to provide a level of socio-economic sustainability because in a society where 80% of the population does some form of farming, these are skills that might benefit participants throughout their lives.

The curriculum of Agriskills trainings also included mixed farming, to decrease dependence on single crops and soil erosion, and enhancing climate resilience. Since the curriculum is not standardized, no conclusions can be derived on the environmental sustainability of the taught practices.

3.7.4. Intra-regional trade

The sustainability condition that is particularly important are the institutional, financial and economic sustainability.

For Regional Integration the project implementer has signed a Memorandum of Understanding with the government. The government is responsible for the maintenance of the facilities. For the borders to be economically attractive, financial resources have to be procured from taxes collected at the border. The border tax administration is located in the facilities and has the ambition to collect more taxes, but it is unlikely that this will soon be implemented. Because the benefits of the project are for the whole Ugandan economy it is likely that government funds will be made available for the posts. The constructed roads have a less clear direct pay-off to the Ugandan government. For Intra-regional trade, after construction, the roads become the responsibility of the district government. Resources of these institutions are limited and it is not clear how well they will be able to maintain the roads. In general, the limited financial resources of the Ugandan government create a risk that projects will not be sustained if this financing is not explicitly secured.

Because there is a clear economic importance of the facilities for users and for traders of all kinds, it is highly likely that the new and improved border posts will maintain their function in the longer term. The economic sustainability is thus secured.

3.7.5. Agro-finance

The key consideration for sustainability are the financial aspect and the economic aspect.

In the case of the Agro-finance project that is based on a Rabobank partnership, the continuation of the mission of 'banking the unbanked' for which this project forms the basis, is threatened if Rabobank decides to step back. During the interviews it became clear that the views of Rabo Development and those of DFCU were not completely aligned. DFCU had expected faster progress in 'capturing' the rural market. It is very questionable whether the project would also take place without funding from the embassy.

It is also questionable whether DFCU will continue targeting the rural population, and especially farmers, once the project funding has ended. This will likely depend on the reached degree of profitability from servicing this segment at the end of the project, which will only be in 2018. Especially since DFCU is currently running pilots with potential mobile services it is difficult to say at this point how likely it is that the project will be successful in the future. The project also included trainings of personnel, on which it was noted that a continuation of training is needed to prevent losing human capital when people leave. On the other hand the grant for this project has allowed DFCU to develop a new business model that has until now proven to be profitable. A few of the local offices were practically out of business and are now flourishing again, therefore it can be assumed that continuation of the work after the project has ended is also beneficial for DFCU. After the projects end it would also be interesting to see how much DFCU has gained from this project and how that relates to the amount granted by EKN.

3.7.6. KAM Support Fund

The central sustainability aspects for the project are economic and institutional.

The central and logical focus of EKN with regard to sustainability lies with the private sector. When projects are able to engage private sector actors e.g. agri-businesses or food processors, a win-win situation is created and the seeds have been planted for continued trade and underlying capacity development of farmers. EKN has actively steered projects in this direction. The fact that the project is implemented by the EKN and overlaps with the regular activities of the embassy makes it more likely that the activities will be continued.

The activities within the KAM Support Fund can be considered catalysing. By promoting business opportunities in Uganda for Dutch enterprises a snowball effect could occur, in which the establishment of a few partnerships can change perception of other Dutch companies. There is however no evidence that this has occurred. The fact that there is a Dutch office at the Ugandan Investment Authority, which is unique, does suggest the embassy's efforts contribute to structural investment. A same effect could be realized through the popularization of 'farming as a business' which EKN successfully does in its publicity through the show 'Best Farmer' in relation with a leading newspaper.

3.7.7. Operationalization DSIP

The main sustainability characteristic to assess are the institutional and financial.

The Operationalisation DSIP project is installed to establish a functioning Agricultural Sector Development Strategy and Investment Plan, which is meant to develop a robust and implementable strategy and policy framework for the MAAIF to strengthen the agricultural sector. The studies create a long term roadmap and vision for the coming decades. Because of the co-creation with the MAAIF, the actual use of the strategy over the years is more likely. DSIP staff noted that the studies have been consulted and used to inform the 5 year strategy plan of the ministry from 2016-2021.

The 5 year investment plans developed by the Operationalisation DSIP are considered less durable. Only a few have been used to inform new projects or investments and the documents will soon need to be updated. Development of in-depth studies at a stage when it will actually be used and with a sharper focus on less themes, as project staff also admitted, might be more valuable. The project staff was unsure of were finance would come from for the follow up studies to maintain the relevance of the reports. This suggests that the financial requirements to continue the influence of the undertaken activities are not ensured.

3.7.8. PASIC

For PASIC the main sustainability aspect that is assessed is institutional.

The PASIC project aims to create a supportive public sector that enables intensification in the agricultural sector, by influencing the political agenda of the Ministry of Agriculture. The project does not systematically contributes to the ministry's capacity or policymaking. Studies and lobby campaigns are topical and PASIC aims to get several policies past at national level before the end of the project, and appeared to consider this a successful ending. Several officials and statisticians have been trained, but the evidence-based policymaking approach has not been institutionalized. Moreover, PASIC applied an inclusive approach to policy setting, using their studies at farmer level and engaging local interest groups for multi-stakeholder consultations. They did not set up lasting platforms nor did they build capacity of local organisations for evidence-based policy advocacy. The political sustainability of the project appears to be limited.

3.7.9. Synthesis of sustainability of portfolio projects

The analysis of the degree to which the projects can be considered sustainable is synthesized in the following table. For each project only the most relevant sustainability aspects have been reported. The sustainability has been classified on a scale from very low to very high, very low meaning that it is

highly unlikely that impact will have a lasting effect beyond the project (or extended project if no considerable changes are made) and very high meaning that it highly likely that lasting change has been realized.

| Sustainability | Institutional | Financial | Environmental | Economic (social) |
|-----------------------------|---------------|-----------|---------------|-------------------|
| CATALIST | - | Low | Sufficient | Some |
| ISSD | High | - | Sufficient | Some |
| Agri-Skills | Low | - | Some | Some |
| aBi-Trust | - | - | - | Some |
| Intraregional Trade | Sufficient | Low | - | High |
| Financial inclusion | - | Low | - | Unknown |
| KAM Support | Some | - | - | Some |
| Operationalizati on DSIP | Low | Low | - | - |
| PASIC | Low | Low | - | - |

Table 37 - Level of sustainability for portfolio projects

3.8. Unplanned, positive or negative, effects of the programme

In some cases, the project did not follow the exact intended pathway. For the projects in the in-depth case studies (Intra-regional trade, Financial inclusion and Agri-skills) the unplanned positive and negative effects are described.

First, an unintended negative effect of the Agri-finance project included the occurrence of debts as farmers could not repay their loans. This was caused by disappointing harvests as a result of climatic variances (droughts as well as too much rainfall). This was noted by Financial Inclusion as well as CATALIST about the 'safe for loan' product. This is a risk which can have the opposite effect on farmers, declining their households' food security. Crop insurance has been introduced to mitigate effects of bad weather and consequent disappointing harvests. However, satellite monitoring and information was missing which meant farmers were disappointed by the low amount of pay-outs. The insurance also entailed an additional costs (of 1% on top of the loan interest rate of $24\%^{188}$).

Additionally, the 'Safe for Loans' project only lends to farmer groups. According to the project staff and staff from Technoserve, a partner NGO, in groups the number of non-serving loans and defaulting on loans is less common then with individual loans. The staff affirmed that the group pressure could lead farmers to service debts at the cost of household food security, but noted they have not collected information on intra-group level. It can thus not be affirmed that other than the actual reported defaults, repayments are made at the cost of food security.

For Intra-regional trade the most important unintended negative effect reported during the focus group discussions is a stagnation of income for small farmers and traders due to the influx of cheap imports of cash crops. Apart from the experienced benefits of exporting, the traders also noted that they generally feel like they benefit from import. However, on the other hand several traders viewed the increasing openness of trade-borders as an issue. This also means that farmers are more vulnerable to international price fluctuations.

Male trader: The last few years import has mainly increased, this has been beneficial because cheaper manufactured products are imported. Merchandize come from Kenya, and from other side. Improved food comes from Uganda, so they will have benefited. Kenya consumes more than it produces so they will have demand, for example for rice from Uganda.

Male (rice) trader: We now have rice coming from Pakistan, and we cannot compete with them. Therefore I have not increased my income.

 $^{^{188}}$ In the interview with the regional office an interest rate of 13% was mentioned, but other stakeholders confirmed the regular rate to be 24%.

Female trader: If you want to export rice you need an agency to report it, and that costs additional money. Dealers on the other hand are able to import large quantities of rice, which is an issue of competition with large businesses.

4. In-depth evaluation aBi-Trust

4.1. Introduction

aBi-Trust is a multi-donor entity jointly founded by the Governments of Denmark and Uganda. This trust supports agribusiness development in the private sector to achieve the objective of the Government of Uganda (GoU) Competitiveness and Investment Climate Strategy (CICS) and the National Dairy Development Strategy and Investment Plan (DSIP). Other development partners include United States Agency for International Development (USAID), European Union (EU), Sweden, Belgium, Embassy of the Kingdom of the Netherlands (EKN), Department for International Development (DFID) and Kreditanstalt fur Wiederaufbau (KfW). aBi-Trust's mission and vision is to have competitive private sector led agriculture in Uganda and to promote private sector agribusiness development to enhance wealth creation in Uganda. aBi-Trust has three subcomponents, namely; Value Chain Development including trade-related Sanitary and Phyto-Sanitary and Quality Management Systems, Financial Services Development and the cross-cutting Gender for Growth component with a fund for piloting innovative gender equality approaches in agriculture.

The aBi-Trust Value Chain Development component was established to improve the performance of selected value chains and their actors through increased demand and matching availability of appropriate inputs and agribusiness services, as well as development of market information services. The focus is on supporting enterprise development, market- and product diversification with organic farming as an important element. The initiative applied the value chain approach to address the constraints faced by agribusinesses, and initially focused on five value chains that included coffee, oil seeds, maize among others. aBi-Trust expanded its activities by supporting the Dairy Value Chain Project which started in November 2012.

The aBi-Trust project made efforts to strengthen market access of the dairy value chain and the different actors in the target geographical area, the South Western Milk Shed. It targeted the critical bottlenecks along the value chain that are impeding sustainable and profitable access to markets. aBi-Trust submitted a project funding request to the Royal Danish Embassy (RDE) which acts as the lead donor for the multi-donor funding to the aBi-Trust. The RDE directed the funding request for dairy development to EKN. The aim of this evaluation therefore is to establish the impact of the interventions for dairy value chain development financed by Dutch aid. Although the Dutch support to aBi-Trust was not earmarked, the RDE assured an attribution to dairy value chain development of at least the amount EKN will contribute.

The project was mainly focused on raising farm income through improved technology and access to markets. aBi-Trust adopted a value chain approach in value chain development; however, EKN expressed a desire for its funding support to be of a relatively short duration to address 'market pull' aspects and reduce the investment subsidy in equipment with society down payment up-front. Thus, the co-funding was only there to complement beneficiary ownership and sustainability of a business model as well as retain financial services development.

The primary beneficiaries of the project are dairy cooperatives and unions who benefit from two types of project activities and intermediate outcomes: (1) professionalization of their members' farming practices, strengthening of the dairy cooperatives and unions, increased farmers access to financial services, access to better storage facilities for their produce (new modern cooling equipment); and (2) increased demand through better access to the market. These intervention specifically included support for:

- 1. Acquisition of assets for:
 - Milk cooling and handling equipment for dairy primary cooperatives
 - Insulated bulk tankers for milk transportation
 - Refrigerated trucks for milk and other dairy products delivery for partnering processors

- Institutional strengthening of dairy cooperatives and unions
- 2. Milk processing initiatives for:
 - Support to UCCCU and others
 - Milk chain quality management
 - Value addition initiatives
 - Financial services development
 - Increasing gender and youth mainstreaming in the dairy value chain
 - Other areas of intervention, including support for the dairy sector platform (currently being mooted); participation in international, regional and national dairy shows, and cosponsoring dairy workshops
 - Programme management by aBi-Trust.

4.1.1. Dairy value chain in Uganda

The East African Dairy Development (EADD) presents seven major players in Uganda's dairy value chain (EADD, 2008). In the illustration according to Figure 24, the players are: (i) primary producers - the dairy farmers; (ii) aggregators; (iii) milk collecting centre personnel; (iv) traders who also referred to as transporters; (v) milk processors; (vi) distributors/retailers, and (vii) finally the consumers. In a study of opportunities for dairy sector development collaboration in East Africa, the Centre of Development Innovation (CDI) demonstrates that the country's structure is similar to the dairy value chain structures of the rest of the countries in the East African Region (CDI, 2014).



Figure 24 - Dairy value chain in Uganda [Source: CDI, 2014]

The role of the farmers is to produce milk that is safe, wholesome and nutritious in quantities that will meet market demands. The aggregators on the other hand are to enhance transportation of milk to milk collecting centres. Their role is to collect milk from the dairy farms. Aggregators are expected to deliver milk to the MCCs within three hours of post-harvest. Subsequently, MCCs are mandated with the responsibility of verifying the quality of milk, bulk it and chill it in preparation for the transporters

who deliver it to the processors. Finally, milk products made by the processors are made available to retailers and are subsequently purchased by the consumers.

The dairy value chain bears both the informal and formal marketing approaches. The informal approach is characterized by sale of raw milk at the farm gate to either the households directly or to the aggregators. The aggregators in-turn primarily sell the bulk of raw milk to MCCs; however, they may also sell the milk directly to consumers comprising of households, eating places or institutions and the MCCs. Worth noting is the fact that the informal approach is more prevalent in most parts of the country when compared to the formal approach.

4.1.2. Detailed programme logic of the aBi-Trust project

The following table lists the components of the aBi-Trust programme, intended beneficiaries, the timing of the interventions and the associated budget.

| Component | Beneficiary | Timeline | Budget ¹⁸⁹ |
|---|--|-------------|---|
| Acquisition of assets | Milk collection centres(MCCs) of UCCCU cooperatives, members of UCCCU cooperatives | 2013 – 2014 | € 1,745,700 excluding the cost-share grants of 50% targeting to initially support the acquisition of 100 coolers. |
| Institutional | UCCCU, | 2013 - 2015 | € 1,105,500 |
| strengthening of coops | cooperatives | | |
| and unions | | | |
| Milk processing initiatives | UCCCU | | € 1,645,167 |
| Financial services development | Dairy farmers, traders, MCCs | 2013 – 2015 | € 549,000 |
| Increasing gender and youth mainstreaming | Members of UCCCU cooperatives | 2013 - 2015 | € 385,050 |
| Other areas of | To be determined | 2013 - 2015 | € 120,000 |
| intervention | | | |
| Programme | aBi-Trust | 2013 - 2015 | € 645,329 |
| management | | | |

Table 38 - Overview components of the aBi-Trust project

As can be seen from Table 38, the main beneficiaries from the aBi-Trust project are UCCCU and the member cooperatives. This distribution of costs ensures that most of the funds go actually to the implementation of the activity at farmers' cooperative level. A considerable proportion of the aid (26.8%) was through the provision of milk cooling and handling equipment to ensure a cold chain in the milk collection. It was expected that this will result in a higher price farmers can fetch for their milk, and less wastage. This in turn would increase the profitability of milk production and subsequently entice farmers to produce more milk. Further, this intervention would increase employment and incomes of those who work in the milk sector. The increased availability of milk, and higher incomes were expected to lead to improved food security and reduced malnutrition.

As mentioned before, this project addressed 'market push' aspects of the dairy value chain. The project proposal stipulated that 'productivity push' aspects of improving herd productivity and production (genetic improvement and herd management, herd nutrition, and herd health/vet care) require longer term investments. Therefore, they remain integral to aBi-Trust's dairy value chain strategy and RDE would subsequently seek additional funding from other sources. These interventions would not be financed by Dutch aid; nevertheless, it was anticipated that they would benefit the same target population.

¹⁸⁹ The total budget also includes a cost escalation of 5% i.e. € 309,787.

4.1.3. Implementation of Interventions

The interventions were implemented through the provision of: (i) Equipment for milk cooling and handling equipment for dairy primary cooperatives; (ii) Insulated bulk tankers for milk transportation; (iii) Refrigerated trucks for milk and other dairy products delivery for partnering processors. In addition, the intervention was delivered through training in the following aspects: (i) Clean Milk Production and Handling; (ii) Lactoscan Cooler, Generator Maintenance and Hygiene; (iii) Milk hygiene, (iv) Ownership and Governance of Farmer Dairy Cooperative Societies; (v) Livestock Feeding and Pasture Establishment & Management; (vi) Dairy Business Management and Quality Control. Overall, the expected outcomes of the interventions were:

- Improved access to markets for the dairy farmers: Dairy households directly benefit through the strengthened dairy cooperatives that are linked to UCCCU;
- Increased quantity of milk marketed: 72 million litres of milk marketed through Milk Collection Centres (MCC) per year by 2015;
- Increased household income: UGX 50.4 billion (about Euro 16m) per year realized from milk sales by MCCs by 2015

Table 39 provides a summary of the interventions; a detailed description of the implementation of the interventions in the aforementioned aspects is presented subsequently. The number of individuals trained in each of the unions or cooperative societies is presented the Appendix section of the report. Nevertheless, a detailed description of the training and related activities undertaken can be obtained from field activity reports for the various project areas submitted to Uganda Crane Creameries Cooperative Union (UCCCU).

| Implementation | Target group | Description of Contents |
|---|-------------------------|--|
| Training | | |
| Clean Milk production and Handling | Farm owners and workers | |
| | | 1. Understanding the nature of milk |
| | | 2. Conditions for Clean Milk production |
| | | 3. Good Milking procedure; Practical exercise in Hand |
| | | Milking and Mastitis composition and volume of milk |
| | | based on feeding |
| | | Milk storage temperature and its effect |
| | | 5. Milk heat treatment and its effect at farm level |
| | | 6. Milk adulteration and its effect |
| | | Treatment of cows with antibiotics and its effect |
| | | 8. Milk Quality assurance during Transportation |
| | | 9. Cleaning and Sanitation process |
| Lactoscan Cooler, Generator Maintenance | Primary cooperative | |
| and Hygiene | society managers | |
| | | 1. Properties of the Lactoscan [including accessories and/or |
| | | consumables supplied with the machine] |
| | | 2. Use of the Lactoscan (including interpretation of results |
| | | Irom the machine) |
| | | 3. Care of the Lactoscan [including cleaning procedure and cleaning solutions] |
| | | <u>A Sefety presentions related to use of the Lastessans</u> |
| | | 4. Safety precautions related to use of the Lactoscans |
| | | messages] |
| Milk hygiene | Farm owners and workers | incosages j |
| | | 1. Understanding the nature of milk |
| | | 2. Conditions for Clean Milk production(Environment and |
| | | utensils) |
| | | 3. Appropriate milk handling utensils, cleaning and |
| | | disinfection. |
| | | 4. Good Milking procedure; Practical exercise in Hand |
| | | Milking and Mastitis Control |
| | | 5. Composition and volume of milk based on feeding, |
| | | gestation period. |
| | | 6 Milk storage temperature and its effect |

- Milk storage temperature and its effect
 Milk heat treatment and its effect at farm level

| Implementation | Target group | Description of Contents |
|---|--|---|
| | | 8. Milk adulteration and its effect |
| | | 9. Treatment of cows with antibiotics and its effect |
| | | 10. Milk Quality assurance during Transportation |
| | | 11. Cleaning and Sanitation process |
| | | 12. Organoleptic test; Procedure, interpretation and |
| | | 10 Manura disposal among others |
| Ownership and Covernance of Fermer Dairy | Dairy Farmors | 13. Manure disposal among others. |
| Cooperative Societies | Daily Faimers | |
| | | 1. Meaning of a cooperative society |
| | | 2. Distinctive features of a cooperative society |
| | | 3. Formation of a Dairy cooperative society |
| | | 4. Meaning of Governance as applied to Dairy cooperatives |
| | | 5. The structure/organs of a dairy cooperative society & |
| | | reporting relationship |
| Livestock Feeding and Pasture Establishment & Management | Dairy Farmers | |
| _ | | 1. Pasture establishment and management |
| | | 2. Fodder preservation |
| | | 3. Hay making and storage |
| Dairy business management and quality control | Managers of Dairy cooperative societies, field operations and monitoring officers | |
| | | 1. Basic Accounting(bookkeeping at society level) |
| | | 2. Financial Management(Budgeting) |
| | | 3. Financial Management(Business Performance reports) |
| | | 4. Implementation of Business plans |
| | | 5. Milk handling operations and their relation to selling price |
| | | and farm gate price determination |
| | | 6. Costing of milk production per litter at farm |
| | | 7. Tips on increasing milk collections at milk collection |
| Dairy Equipment | | |
| Acquisition of Assets | Dairy Cooperative | |
| requisition of rissets | Society/MCC | |

1. 92 MCCs supported with 100 owned coolers

| Implementation | | Target group | Description of Contents |
|---------------------------|-----------------------|-------------------------|--|
| | | | 2. 92 MCCs supported with 100 owned generators |
| | | | 1,500 aluminum milk cans procured for MCCs |
| | | | 92 MCCs supported with 100 owned milk testing kits and/or min-lab equipment |
| | Acquisition of Assets | UCCCU | |
| | | | 1. Four (4) refrigerated trucks procured for UCCCU [Yet to be delivered] |
| | | | 10 insulated milk tankers procured with a total capacity of 74,000Ltr [Two carry 3,000Ltr each while the remaining eight carry each 6000Ltr] |
| | | Dairy processing plants | |
| | | | 20 entities/dairy processing plants supported that produce 20 different dairy products |
| Financial Services | | | |
| | | | a) Five (5) financial institutions supported to finance dairy |
| | | | b) Five (5) financial Products developed for the dairy sector |

Table 39 - Implementation of intervention in the treatment group

Note. The equipment procured for the intervention were provided on a matching basis with 50% down payment by the primary dairy cooperative society.

| Implementation | Target group | Description of Contents |
|---|---------------|---|
| Research and Training | | |
| On Farm Milk Hygiene | Dairy farmers | |
| | | Proper milking procedure and milking hygiene |
| | | 2. Milk handling during storage and transportation |
| | | Appropriate milking and milk storage Equipment |
| | | Suitable milk delivery time and transportation conditions |
| Bovine Mastitis; Epidemiology, Prevention and Treatment | Dairy farmers | |
| | | 1. Causes of Mastitis |
| | | Ways to prevent occurrence of mastitis in a dairy herd |
| | | 3. Mastitis control measures |
| | | 4. Ways to eliminate mastitis |
| Occurrence of Bovine Brucellosis | Dairy farmers | |
| | | 1. Signs of brucellosis disease in cattle |
| | | Factors that lead to transmission of brucellosis in cattle |
| Occurrence of Drugs and Chemical residues in Raw milk | Dairy Farmers | |
| | | Antimicrobial contamination of milk and effects on public |
| | | health |
| | | 2. Chemical contamination of milk and effects on public |
| | | health |
| | | Factors that lead to occurrence of drug residues in milk |

Table 40 - Activities Implemented in the control group
4.1.3.1. Training

Capacity building through the training was conducted for the following persons: Farm owners and workers, dairy cooperative society managers of, field operations and monitoring officers; UCCCU Field Operations Staff as well as Society Managers and Milk Assistants manning Primary Dairy Cooperative Societies in the southwestern catchment area. The training was implemented in 12 districts of the Southwestern region of Uganda through the Dairy Value Chain Development Project (DVCD). The aim of the training was to empower primary cooperatives in the catchment area to be strong, efficient and able to competitively access markets for their milk and milk products for increased incomes. The training was not conducted for all dairy farming households and individuals in the treatment area. It was envisaged that the individuals trained would pass-on the knowledge and skills acquired to other members of a dairy cooperative society.

The training targeted three major actors in the dairy value chain. The first category of actors was farm workers who comprised included farm owners, farm managers as well as milking men and herdsmen. It was observed that farm owners were in some instances not permanent residents at the farms; and therefore not always available for training. In such cases persons in charge of the day-to-day activities of the dairy farm were trained. The second categories of actors were persons responsible for transporting milk from the dairy farms to the Milk Collecting Centres (MCCs). These individuals would either be farmers themselves or milk vendors/traders. The third category was the personnel manning the MCCs i.e MCC dairy managers and milk assistants. Training therefore encompassed all post-harvest milk handling activities from the farm to the milk collecting centres.

A detailed description of the topics and participants for each of the training is described subsequently Further, a description of the training outputs and related aspects is presented in the Appendix section.

Clean Milk Production and Handling

Certainly, the responsibility of ensuring that dairy products manufactured are safe for human consumption begins on the farm. Therefore, farmers and/or milk handling workers in the households in the catchment area were trained in clean milk production and handling. The objective of the training was to promote best practices in quality management of milk; thus, reducing post-harvest losses of milk that are due to poor milk handling. The training was undertaken on selected farms of dairy cooperative members that subscribe to UCCCU in the south western catchment area. The training was implemented through the Dairy Value Chain Development Project (DVCD) aimed at empowering the primary cooperatives in the catchment area. Both theoretical and practical approaches on farm best practices to produce clean milk at the household level were applied in the training.

Lactoscan Cooler, Generator Maintenance and Hygiene

Primary dairy cooperative society managers and leaders were trained on Lactoscan cooler as well as generator maintenance and hygiene. The objective of training was to empower these individuals with the relevant skills to smoothly operate the Lactoscans in receiving and subsequently market quality mill suitable for processing. The participants in the training were managers and/or leaders of primary dairy cooperative societies in the unions namely Ntungamo Dairy Farmers' Union, Mbarara (MBDFCU), Ibanda (INKA) and Bushenyi (BUDICU) Unions, Kazo primary cooperative societies. In particular, the participants were: (i) Milk Assistants, (ii) Dairy cooperative managers (Chairperson and Vice Chairpersons, Treasurer and secretary as well as managers and assistant managers), and (iii) dairy cooperative members and/or farmers. Similar to the training on clean milk production and handling, the training was implemented through the Dairy Value Chain Development Project (DVCD).

Milk hygiene

Farm owners and workers that subscribe to UCCCU in the south western region were trained in mill quality handling and hygiene. The training was implemented through the Dairy Value Chain Developmen Project (DVCD). In particular, the training aimed at: (i) increasing the amount of milk marketed through

the farmer owned collection chain from the 50 million litres to at-least 72 million litres per year by the end of the project; (ii) generating at-least UGX 50 billion per year from milk sales by farmer societies by the end of the project; (iii) Enhancing value added services provided to farmers by the dairy cooperatives (iv) reducing post-harvest losses of milk due to spoilage and spillage to at-most 5%.

The development and delivery of the training materials involved consultation and participation of the relevant stakeholders including the farmer leaders, MCC managers, District VET officers, Dairy Development Authority. These individuals were asked to identify needs and information needed to develop training materials and deliver training sessions based on gaps identified. The training was delivered in two major stages: First, Training of Trainers (TOT) in milk quality handling and hygiene covering the aspects namely requirements for hygienic milk production, personnel hygiene and health cleaning and disinfection of dairy equipment, cattle diseases and how they affect milk quality and production, storage and transportation of milk. Further, the trainees were equipped with skills or conducting farmer trainings and identifying farmer needs. Second, the farmers and farm workers from the selected dairy cooperatives that subscribe to UCCCU in the catchment area were trained on the same aspects. In particular, at-least one field training session was conducted for each primary dairy cooperative with follow-up sessions depending on the identified gaps. As earlier indicated, the farm owners and/or workers were trained on factors affecting milk quality – personnel and farm hygiene, cleanliness of mill containers, storage and transportation as well as cattle diseases and their effect on milk quality.

Ownership and Governance of Farmer Dairy Cooperative Societies

Dairy farmers and potential members of dairy cooperative societies subscribing to UCCCU were trained on ownership and governance of farmer dairy cooperative societies. The potential members refer to dairy farmers who deliver milk at a MCC but are not formerly registered with the centre. In particular, the members and participants in the training were drawn from seven districts namely Kabale, Rukungiri Ntungamo, Mbarara, Ibanda, Isingiro, Kazo (county) and Kiruhura. The overall goal of training was to build strong dairy cooperative societies by giving basic knowledge in ownership and governance o cooperative organizations so as to enable members apply this knowledge in building and supporting their own organizations. Specifically, the training was organized to meet the following objectives: (i) introduce farmers to basic cooperative principles and practices so as to know why they should form, run and maintain these farmer organizations; (ii) introduce them to basic governance structures of a cooperative organization; (iii) enable farmers' understand and appreciate their rights, roles and responsibilities; (iv understand the importance of good and conditions for good governance in cooperative organization; (v prepare them for readiness to participate in the UCCCU/ABI-Trust capacity-building initiative o subsidising the purchase of equipment and tools; and (vi) stimulate farmers critical thinking on how to complete the UCCCU dairy plant meant to solve most of the current marketing problems of dairy farmers in the Region.

In light of the objectives, the core content of the training comprised of the following: meaning of a cooperative society, distinctive features of a cooperative society; Formation of a Dairy cooperative society meaning of Governance as applied to Dairy cooperatives; structure/organs of a dairy cooperative society & reporting relationship, rights, roles and responsibilities of each organ; separation of powers as well as importance of good leadership in relation to transparency, integrity and accountability. In addition, the training was used as an avenue for informing the farmers about the aBi-Trust grant equipmen (comprising coolers, generators, cans and min lab equipment) that they were to receive under the project Despite the remarkable achievement in the delivery of the training, five major challenges were noted by the training participants, namely sub-optimal turn-up of participants, lack of basic knowledge in cooperative practices, time keeping, changes in program and falling milk prices. In particular, the sub optimal turn-up of the members was attributed mainly to interruptions in program due to unforeseer circumstances and seasonal events, dormant membership in cooperative societies, logistical issues and timing of the training.

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Livestock Feeding and Pasture Establishment & Management

Farm owners and workers that subscribe to UCCCU in the south western region were trained on livestock feeding and pasture establishment and management. The purpose of this training was to narrow the gaps in dairy animal feeding by imparting knowledge and skills in preserving fodder in form of hay and silage to address dry season feeding. In particular, the farmers were trained on pasture establishment and management, fodder preservation as well as hay making and storage. The training was geared towards assisting farmers to realize stable dairy productivity through the year as a result of a sustained feeding and management practices. In addition to the theoretical sessions, the training adopted practica demonstrations to enhance the benefits of the training. The demonstrations of the training on selected farms covered the following farm layout, demonstrating seed pre-treatment and planting, weeding gap filling, manuring, harvesting for hay making as well as drying and hay storage.

Dairy Business Management and Quality Control

Managers of dairy cooperative societies as well as field operations and monitoring officers were trained in dairy business management and quality control. Similar to the rest of the programs, the training was implemented through the Dairy Value Chain Development Project (DVCD). In particular, the purpose o the training was to equip participants with knowledge and skills to enable them run and manage dairy cooperative societies profitably and efficiently. As earlier indicated, the participants in the training were UCCCU Field Operations Staff as well as Society Managers and Milk Assistants manning Primary Dairy Cooperative Societies in the area of operation including Lyantonde and Kamwenge.

Both theoretical and practical approaches were applied in the training comprising the following: lecture method, group presentations, observations and role plays. Further, participants were involved in practical sessions to enhance assimilation of the training objectives. The Training was largely conducted in English but with a few supplements delivered in vernacular for deeper understanding of concepts. The language adopted in training the managers was appropriate since these individuals were generally literate. The training covered seven major aspects: (i) Basic Accounting - bookkeeping at society level; (ii) Financial Management -Business Performance reports; (iv) Implementation o Business plans, (v) Milk handling operations and their relation to selling price and farm gate price determination; (vi) Costing of milk production per litre at farm; (vii) Tips on increasing milk collections a milk collection centres.

The major challenges noted during the training were poor record keeping at farm and society levels, lack of separation of powers, lack of managerial skills; lack of governance knowledge and skills by some board members, lack of proper operating system; as well as shortfalls in basic knowledge of business and related aspects. In order to enhance success of the training and related program activities, the monitoring visits to dairy cooperative societies were intentionally programmed to address the challenges cited during the training.

4.1.3.2. Asset acquisition

Primary dairy cooperatives received milk cooling and handling equipment comprising of the following coolers, milk cans and min-laboratory equipment. In particular, 100 coolers, generators and sets or testing kits were delivered to 92 Milk Collection Centres (MCC). However, 14 of these coolers were installed in seven bulk collection centres. Each of the coolers was distributed with 15 aluminium milk cans – thus, making a total of 1500 cans distributed. Further, the unions received 10 insulated bulk tankers for milk transportation with an overall carrying capacity of 74,000 litres (two of the tankers carry 3,000 litres each while the remaining eight carry each 6000 litres. However, UCCCU is yet to receive the refrigerated trucks for milk and other dairy products delivery for partnering processors. The equipment delivered to dairy cooperative societies were provided on a matching basis with 50% subsidized payment modality, where the primary dairy cooperative society met half of the cost and the rest was a grant through the intervention. In the implementation, only seven (7) coolers were fully paid off by the cooperative societies prior to the installation. For the rest of the coolers, 10% of the cooperative society's share of the cost was

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deposited prior to installation while the remaining amount was given as a loan through Pride Microfinance – a financial institution operation in the region and country at large. In addition to the equipment dairy processing plants were supported that produce various dairy products.

4.1.4. Difficulties in the implementation

As described earlier, primary dairy cooperative society managers were trained on the use and maintenance of the equipment. The objective of the training was to empower these individuals to smoothly operate the equipment with minimal supervision and assistance. However, three major challenges were noted in the course of the training: (i) Centres allocated the Lactoscans did not have suitable/functional laboratories for their placement. In particular, the machine needed a laboratory room that is equipped with voltage/guard, extension cable, worktop, kitchen sink well drained; (ii) Fear or regular maintenance and repair in case need arises; (iii) Cleaning reagents (including distilled/hot water) were not readily available at the cooperative societies. To this end, the utilization of the equipment will depend highly on how these challenges are addressed. In addition to the equipment, insulated mill tankers were procured for the transportation of milk from the dairy cooperative societies or bulk collection centres to processing plants.

At the individual level, dairy farmers and potential members of dairy cooperative societies were trained or a wide range of aspects comprising however not limited to the following: clean milk production and handling, milk hygiene, ownership and governance of farmer dairy cooperative societies; livestock feeding and pasture establishment and management. The training sessions were largely conducted on selected farms of dairy cooperative members that subscribe to UCCCU in the catchment area. The training adopted both practical and theoretical approaches comprising lecture method, group discussions, observations and role play. Group discussions were adopted to enable both males and females to participate fully in the training; while practical sessions enhanced assimilation of the training objectives. Participatory Rura Appraisal (PRA) techniques - suitable for application in community development initiatives - were adopted to ensure a high degree of participation in the training. The development and delivery of the training materials involved consultations and participation of the relevant stakeholders including farmer leaders, MCC managers, District VET officers and Dairy development authorities. This evidence demonstrates that the training was highly participatory and involved relevant stakeholders; it was - to a great extent - tailored to meet the specific needs of the farmers in the catchment area. Despite the remarkable achievement in the delivery of the training, several challenges were encountered comprising the following: lack of basic knowledge in cooperative activities, low turn-up of farmers, time keeping inaccessibility of some training centres due to poor road network; low adoption rates of information acquired. In light of the challenges, the need for regular follow-up of the farmers will go a long way in enhancing technological adoption rates particularly at the farm level.

Managers of dairy cooperative societies and field operations and monitoring officers were equally equipped with relevant skills in dairy business management and quality control. Unlike the training of farmer owners and workers which was largely in vernacular, the training for the managers was largely conducted in English. Subsequently, the materials for the training of farm owners and workers were translated to the local languages to ensure a deeper understanding of the concepts. Nevertheless, the training sessions were conducted using relevant languages for effective communication. Similar to other interventions, the training the training did not involve all dairy farming households in the treatment area It was assumed that the individuals trained would pass on their knowledge attained from the training to others. However, there was hardly any documented evidence for assessing the extent to which this "trickle-down effect" actually materialized. Therefore, the risk of having only a few people per cooperative trained puts to question the retention of the knowledge acquired by the cooperative societies and individual dairy farming households.

In summary, it is evident that the intervention involved – to a greater extent- all relevant stakeholders in the quality milk chain comprising mainly of the dairy farmer, the receivers of the milk (dairy cooperative)

societies) and processors of the milk. The integral approach to the intervention is an assurance that the implementation was undertaken to ensure quality production process at all levels of milk production and handling.

4.1.5. Food Security

In light of the fact that the Dutch Food Security programme focuses on milk production and farmer incomes, it was envisaged that the intervention will have an effect on food availability and accessibility According to the food security definition of 1996 World Food Summit, four main dimensions of food security can be identified: food availability, food access, food utilization and stability. The first two indicators of the Dutch programme can be linked to the dimensions of food security, as shown in Figure 25^{190} .



Figure 25 - Hierarchical dimensions of food security

In particular, the expected outcomes of the project in relation to the results chain of the Dutch Food Security program are:

- 1. Farmer income and production;
- 2. Indirect effects, including increased income through jobs for landless people
- 3. Farming practices (e.g. access to credit, inputs including labour, trainings)
- 4. expected or extrapolated reduction in food insecurity, in terms of food insecure people improving their food security situation.

 190 Based on 'Food security concept and indicator guide, pre-study for evaluating the impact of projects that are part of the Dutch food security policy 2012 - 2015', Working paper, 01-NOV-2013

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Overall, the interventions are geared towards achieving progress against three major impact indicators namely, increase in household food production, increase in farm income and strengthening of economic cooperation.

4.1.6. Activities in the Control Area

Despite the fact that the interventions were implemented in the treatment area only, the control group received some of the services from other actors in the dairy industry. For example, dairy farmers received research based training from Makerere University through the Agshare project. Research areas and consequently training themes; (i) On Farm Milk hygiene; Farmers were exposed to proper milking procedures, milk handling during storage and transportation, appropriate milking and storage equipment and suitable milk delivery time and transportation conditions (ii) Bovine mastitis epidemiology prevention and treatment; revealing causes of mastitis, ways to prevent it's occurrence and how to eliminate it entirely from the herd. (iii) Brucellosis in cattle; how to identify brucellosis disease in a herd and steps to curtail its transmission (iv) Occurrence of drugs and chemical residues in milk; explaining how antimicrobial and chemical substances gain access to milk. In addition, farmers received training from other dairy industry actors like Heifer Project International through the East African Dairy Development Project; and NAADs through local government.

Despite these activities undertaken, the control group did not benefit in any way from the acquisition of milk processing and handling equipment. Certainly, this was a major component of the intervention in the treatment area. In addition, the training received in the control area was limited in scope and coverage when compared to the implementation in the treatment group. Therefore, it is highly likely that the activities implemented in the control group will significantly influence the evaluation of the intervention in the treatment group.

4.1.7. Purpose of the Evaluation

A baseline survey was undertaken in 2014 to provide baseline information on the project indicators. An end line survey was subsequently conducted to facilitate the measurement of the aBi-Trust project effectiveness. Further, the end line survey was undertaken to facilitate the measurement of the fina project impact particularly regarding the project interventions on the households' food security and welfare. Therefore, the purpose of the evaluation is to provide an understanding of the changes in the treatment group and whether the impact (if any) could be attributed to the project interventions.

4.2. Methodology

This section presents the methodology of the end line evaluation. In particular, the section presents a detailed explanation of the ethical clearance, study population and sampling, data collection methods and tools as well as data analysis.

4.2.1. Ethical Clearance

Ethical clearance for this study was provided by the Institutional Research Committee (IRC) of Mbarara University of Science and Technology (MUST). The aim of the clearance was to ensure that the survey is conducted in compliance with the protocol and complaint with international and national regulations. I was also aimed at ensuring that the respondents fully understood the nature and purpose of the survey and give consent before being subjected to the questionnaire. To this effect, the IRC provided consent forms in English, which we translated in both Runyakitara and Luganda to ensure that all our respondents participated in the baseline survey voluntary.

The confidentiality of data was observed during the collection and analysis; the results were reported as aggregates with no feature to link it to the individual households. However, identification features were maintained to enable cleaning of data and for the local investigators to call back in case of clarifications.

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was also necessary to record identification particulars of the respondents to enable follow up at the end line.

All the documents approved by IRC were submitted to Uganda National Science and Technolog (UNCST), which approved the research and issued a permit for a period of 3 years - up to 2017. UNCST is a body that has the mandate to facilitate and coordinate research activities in the country.

4.2.2. Study Population

Similar to the baseline survey, the end-line evaluation was carried out among cooperatives and dairy farmers in the south-western and central regions of Uganda. Farmers in the south-western region – the treatment group – was obtained from the districts Kiruhura, Ibanda, Mbarara, Isingiro, Ntungamo Rukungiri, Kabale, and Sheema. Farmers in these districts are organized under nine major unions namely:

- 1. Bushenyi Dairy Industry Cooperative Union (BUDICU)
- 2. Inka Dairies Cooperative Union (INKA)
- 3. Isingiro Dairy Farmers Cooperative Union (ISDAFU)
- 4. Banyakigezi Dairy Farmers Cooperative Union (BANYAKIGEZI)
- 5. Ankole Dairy Products Cooperative Union (ADPCU) and Kazo
- 6. Mbarara District Dairy Farmers Cooperative Union (MBADIFCU)
- 7. Ntungamo Dairy Farmers Cooperative Union (NDAFCU)
- 8. Rukungiri Dairy Farmers Cooperative Union (RUDAFCU)
- 9. Sheema Dairy farmers Cooperative Marketing Enterprise Union (SHEEMA).

The unions have a total 90 primary dairy cooperatives with varying number of dairy farmers and Milk Collection Centres (MCCs). On the other hand, the control group comprised of dairy farmers in the two districts of Kiboga and Kyankwanzi. Unlike the treatment group, dairy cooperatives in the control group are not organized in unions.

Similar to the baseline, the study population at the end line comprised all active and non-active cooperative members supplying milk to the dairy cooperatives in the regions. Further, non-members in the selected villages were considered. The non-members represent individuals who supply milk to a dairy cooperative but are not registered members. However, the analysis in the subsequent sections is no disaggregated by whether or not a dairy farmer was a member or not. The most important aspect was that the dairy farmer supplies milk to the MCCs. A detailed description of the sampling procedures adopted in selecting the cooperatives and farmers is presented in the subsequent section.

4.2.3. Sample size and Design

The end line survey followed the sampling methodology adopted at the baseline with minor amendments for the primary cooperatives and dairy farming households as illustrated in the subsequent sections.

4.2.3.1. Sampling of Primary Cooperatives

The primary cooperatives in the treatment area [N = 90] were stratified by cooperative union and the number of primary cooperatives considered in each union were obtained using PPS. A simple random sample of the cooperatives in the treatment area was then drawn from each of the unions as illustrated in Table 41.

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| Union Code [District] | Cooperatives | % of Group ^a | Proportionate sample |
|--|------------------------------|---|-----------------------------|
| Treatment group | | | |
| INKA [Ibanda] | 3 | 3.3% | 2 |
| ISDAFU [Isingiro] | 4 | 4.4% | 2 |
| SHEEMA[Sheema] | 5 | 5.6% | 3 |
| BANYAKIGEZI [Kabale] | 2 | 2.2% | 1 |
| ADPCU & KAZO [Kiruhura] | 52 | 57.8% | 28 |
| MBADFCU [Mbarara] | 7 | 7.8% | 3 |
| NDAFCU [Ntungamo] | 14 | 15.6% | 7 |
| RUDAFCU[Rukungiri] | 3 | 3.3% | 2 |
| Total | 90 | 100% | 48 |
| Control group | | | |
| [Kiboga] | 3 | 60% | 3 |
| [Kyankwanzi] | 2 | 40% | 2 |
| Total | 5 | 100% | 5 |
| NDAFCU [Ntungamo] RUDAFCU[Rukungiri] Total Control group [Kiboga] [Kyankwanzi] Total | 14 3 90 3 2 5 | 15.6% 3.3% 100% 60% 40% 100% | 7 2 48 3 2 5 |

 Table 41 - Summary of sampled cooperatives in the treatment and control areas

Note. Cooperatives in the control group have several MCCs; ^a group denotes control and treatment

The control area had no active dairy unions at the baseline and end line stages of the evaluation. Thus, the collection of data in the control area was undertaken from the active dairy primary cooperatives However, Kyankwanzi Dairy Farmers Cooperative has since disintegrated and cannot be replaced with another cooperative in Kyankwanzi district. Therefore, collection of institutional data in the control area at the end line was done in the two cooperatives the Kiboga district namely Dwaniro Dairy & Livestock Coop Society Ltd and Kiboga Livestock farmers coop society Ltd. Further, farmers who were registered with Kyankwanzi Dairy Farmers Cooperative at the baseline were included in the data collection at the end line despite the disintegration of the cooperative society.

4.2.3.2. Sampling Dairy Farming Households

The number of dairy farming households to be considered from each of the cooperatives at the end line had earlier been determined at the baseline using an appropriate sampling technique. During the baseline survey, it was established that whereas the required sample size of 470 dairy farming households was easily available in the treatment area, the control area had fewer respondents. As a matter of fact, the required sample (470 dairy farming households) was not achieved even after almost covering the entire population of farming households in the control area.

| Study Area | Sample size of dairy farmin | g households visited |
|------------|-----------------------------|----------------------|
| | | |
| Treatment | 470 | 390 |
| Control | 370 | 310 |
| Total | 840 | 700 |

Table 42 - Sample size dairy farming households during baseline

Since by design the end-line data was collected from the same dairy farming households visited during the baseline, the above sample size was applied. The 840 dairy farming households were obtained from two randomly selected villages for each of the selected cooperatives in the treatment area, and from all the villages surrounding the primary cooperatives in the control area. However, a total of 700 completed interviews of farming households were obtained. The reasons for the attrition comprised mainly of the

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following: refusal to participate in the study due to personal reasons or conflicts attributed to divisions among the dairy cooperatives in the area and the farmers, death of member and relocation of household.

4.2.4. Selection of the Control Group

The control areas covered Kyankwanzi and Kiboga districts in the central location milk shed. The centra region and specifically the two districts were identified for the control groups, for the following reasons:

- 1. The central region milk shed contributes 24% of Uganda's national milk production compared to 25% of the South Western milk shed (treatment area); hence the two milk sheds were more comparable to each other than the rest of the milk sheds which have relatively lower national mill production contributions i.e. Eastern 21%, Karamoja 7%, Mid-western 12% and Northern 11%.
- The chosen control districts are a distance from the treatment area/districts and hence the possibility of spill-overs was minimized.
- 3. Just like the treatment area districts, the chosen control districts have cooperative societies, only that they are not as organized as the UCCCU cooperative members. They also have and operate Sameer coolers. The coolers are however not the same ones supplied to the treatment group by aBi-Trust through the intervention.
- 4. Like the Southern Western milk shed districts, the two districts are located in the cattle corridor with almost same climatic conditions, hence very suitable for comparison.
- 5. At the time of the baseline survey, there was no evidence of projects similar to the aBi-Trus support to dairy value chain development in South Western Uganda; that were being planned for implementation in the two districts in the next two years.

4.2.5. Sampling Design

A two-stage stratified sampling design was adopted. At the first stage, dairy cooperatives – the Primary Sampling Units (PSU) – were selected using Probability Proportion to Size (PPS). Households or dairy farmers were – at the second stage – selected from the cooperatives using simple random sampling. The number of farmers to be considered in each dairy cooperative was selected using PPS based on ar estimated population of 2,485 dairy farming households in the treatment region. Households were selected from three randomly selected villages in the treatment group. On the other hand, dairy farming households were selected from three randomly selected villages in the control group. Due to the multi stage sampling adopted, a design weight was calculated to ensure representativeness of dairy farming households in the study area. The sampling weight was given by the product of the first and second stage weights. The first and second stage weights were derived from the probabilities of selecting a dairy

cooperative and farmer, respectively. Thus, the selected household jin a dairy cooperative $\,\dot{i}\,$ had a

sampling weight ($W_{d,jj}$) equal to:

$$w_{d,ij} = \frac{1}{p_{1,i}} * \frac{1}{p_{2,ij}}$$
(1)

Where $p_{1,i}$ is the probability of selecting a dairy cooperative i at the first stage while $p_{2,ij}$ is the

probability of selecting dairy farmer or household jat the second stage given that a cooperative i was selected at the first stage.

4.2.6. Data Collection Methods and Tools

Data collection was undertaken using three categories of interviewer administered questionnaires. First the household questionnaire was administered to dairy farmers in the randomly selected villages served

by a selected dairy cooperative. The questionnaire comprised of eleven major themes namely, housing and facilities, land use and ownership, dairy production and utilization, expenditures on dairy production crop production and sales; expenditures on agricultural inputs and crop production; farm employment membership and training; other household income; food consumption and expenditure as well as nutrition. Secondly, an institutional questionnaire was administered to the dairy cooperatives in both the treatment and control groups. The questionnaire comprised three major themes namely, milk business transactions; dairy equipment and machinery; as well as cooperative society management and governance. Thirdly, a questionnaire was administered to milk vendors purchasing milk from the dairy farmers who either supply milk to the dairy cooperatives in the selected districts or retail the milk to the market place. The tool comprised of three major themes namely, vendor business transactions, as well as vending business expenditure and employment.

To facilitate ease of data collection, the questionnaires were translated into Runyankore-Rukiga and Luganda - the main dialects of both the treatment and the control areas to assist the interviewers with the field translations.

4.2.7. Pre-survey

In March 2014, a one-week pre-survey was carried out where UCCCU officials were met at their head office. The officials assisted us with the updated sampling frame of the unions and primary cooperative societies that are beneficiaries of the aBi-Trust project. UCCCU also provided the contacts of their field officers to assist in the visit to the unions and the primary cooperative societies. The team then revisited the sample based on the information obtained and visited the unions and some primary cooperative societies to get lists of villages where their members reside. A similar visit was conducted in June 2016 to facilitate the collection of data that was to be done shortly after.

In the South-western region (the treatment area), nine (9) Unions were visited located in eight districts Mbarara District Dairy Farmers Cooperative Union has three primary societies namely Abesigana Kashar Dairy Farmers Cooperative Society, Kashaka Dairy Farmers Cooperative Society and Rukaka Dairy Cooperative Society. In Kiruhura district, Ankole Dairy Products Cooperative Union and Kazo Union were visited. Three dairy cooperatives belonging to the INKA Dairies Cooperative Union in Ibanda district were visited. In Insingiro district, four dairy cooperatives were visited belonging to Isingiro Dairy Farmers Cooperative Union. Ntungamo Dairy Farmers Cooperative Union and Banyakigezi Dairy Cooperative Unions were considered in Rukungiri Dairy Farmers Union and Banyakigezi Dairy Cooperative Unions were considered in Rukungiri and Kabale districts, respectively. In Sheema district, three out of the five dairy cooperatives were considered, namely Sheema Dairy farmers Cooperative Marketing Enterprise Union Kigarama and Kanyamukondo primary cooperatives societies.

During the pre-survey, the questionnaires were pre-tested and subsequently revised according to the issues that arose therein. At the baseline and end line, the pre-visits were conducted in the control area involving two primary cooperative societies in Kiboga and Kyankwanzi districts. The cooperative in the control group during the baseline were Dwaniro Dairy Livestock Cooperative Society, Bukomero Livestock Farmers Cooperative Society and Kyankwanzi Dairy and Livestock Cooperative Society. However, only Dwaniro Dairy Livestock Cooperative Society. However, only Dwaniro Dairy Livestock Cooperative Society were visited at the end line since the rest of the cooperatives did not exist.

4.2.8. Training of Enumerators

Similar to the baseline, Supervisors and Research Assistants at the end line were trained for three days. The first two days focused on survey objectives and methodology, sample size, techniques for selecting sample households, ways of administering questionnaires with households and cooperatives and vendors spelling out the roles of the supervisors and the research assistants as well as the cooperation expected with the communities including the ethics of the study. A number of simulation and role play sessions

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were done to familiarize enumerators with questions in the household and the Institutional questionnaires.

The third day was spent on practical training where the enumerators were made to administer the questionnaires in one village in the control area supervised by the facilitators of the training. After the field work the enumerators shared their field experiences at a feedback session facilitated by the trainers. The main areas of discussion were questionnaire content and how it was responded to by the respondents and interview techniques used. This resulted in the revision of the questionnaires and manual accordingly. The manual was generated to provide a detailed explanation of the various aspects in the questionnaire.

4.2.9. Data Collection

As earlier indicated, the baseline and end line surveys adopted both quantitative and qualitative approaches of data collection and analysis subsequently. The subsequent sections present a detailed explanation of data collection using each of the approaches or methodologies.

4.2.9.1. Quantitative Data Collection

Quantitative data was collected using the approved quantitative data collection tools. The quantitative data was collected from the UCCCU, Cooperative Unions, Primary Cooperatives and dairy farming households over a period of three weeks, starting with the treatment area. Institutional data was collected by the supervisors, who were responsible for overseeing the principal researcher and Key specialists while data from dairy farming households was collected by the research assistants. All data collected was instantly reviewed by the supervisors who recommended passing or failing the completed survey questionnaire. The data collection of the end line survey in the treatment and control areas was undertaken in July 2016. In case of a fail, the data collectors will immediately asked to follow up the concerned households to rectify any inconsistencies or ambiguities identified.

4.2.9.2. Qualitative Data Collection

Qualitative data was collected using Focus Group Discussions (FGD). Overall, six FGDs were conducted four in the treatment and two in the control area. Similar to the baseline, the participants in the FDGs were between 8-12 members comprising farmers, vendors and members of the dairy cooperatives. The interviews for the FGDs were guided by the findings of the quantitative data analysis. The qualitative data was compiled to explain and enrich the findings from the quantitative analysis at the baseline and end line stages of the evaluation.

4.2.10. Data coding and entry

A team of eight (8) data entrants were trained to code and enter data using a pre-designed data entry screen. The data entry exercise commenced a week after the data collection exercise in order to allow for enough time to quickly address any issues that may have emerged; but also to ensure the timely completion of the assignment.

4.2.11. Data Management and Analysis

Data was entered using a capturing screen designed in EPIIDATA. Subsequently, the data was exported to STATA for cleaning and analysis. During the cleaning, validity, consistency and completeness of data captured in the various themes was assessed. The subsequent sections present a layout of the management and analysis of quantitative and qualitative data at institutional and dairy farming household level.

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4.2.11.1. Institutional Level Outcomes

In light of a relatively small number of primary cooperatives in the control area, a comparison of trends in outcomes between a treatment and control group is not possible at the cooperative level. In other words statistical tests to ascertain whether or not differentials exist in the institutional indicators – between the control and treatment groups – do not yield valid conclusions about the data.

Section 3 presents the results of the institutional level analysis. Table 43 presents a summary of the institutional level indicators that were assessed in respect of the various result/outcome areas at baseline and end-line in the treatment and control areas.

A descriptive analysis of the baseline and end-line quantities/status of part of the institutional indicators was made using frequency distributions and summary statistics where applicable. The assessment was made on indicators in the themes of asset ownership operation and maintenance as well as cooperatives governance.

The overall assumption is that the installation of equipment (milk coolers, transportation and testing equipment) at the primary cooperatives will increase the local price of milk. This is based on the expectation that the coolers will increase the bargaining power of the cooperatives towards their clients so that they can sell their milk for higher prices, and the expectation that the cooperatives will pay higher prices to the milk suppliers (the farmers) consequently.

In order to analyse this in terms of cooperative transactions, the analysis exploits the time series format of the data on volumes and prices of milk bought and sold in order to overcome to issue of the small control group. The analysis compares those indicators in the period before treatment to the period after obtaining treatment. A more detailed description of the methodology is given in section 3.3.

| Result area | Indicators analysed |
|-----------------------|--|
| | |
| Cooperatives Pusiness | Volume of milk cold nor month disaggragated by entergoin of hypers i a |
| transactions | processor, direct consumers, vendors, etc; |
| | volume of milk bought per month, disaggregated by membership; |
| | number and percentage of suppliers of milk rejected at the cooperative, and the main reasons for rejection; |
| | volume of unutilized (unsold) milk per month/year; |
| | annual turnover/rate of growth in turnover; |
| | buying price, selling price and margin per litre of milk sold per month; |
| | number and type of tests carried out on milk received, including reasons why they are not carried out; |
| | number and nature of other services carried out by the cooperatives; |
| Asset ownership, | quantity, capacity and condition of assets (coolers, generators, land, |
| operation and | premises, vehicles, milk delivery tank/truck, milk testing kit/mini |
| maintenance | cooperative; |
| | number of months (in the last 12 months) when equipment (coolers, generators, transportation trucks, etc.) were not operational; |

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| | annual operation and maintenance cost per litre of milk; |
|--------------------------------|--|
| Cooperatives management and | number of fully registered cooperatives |
| governance | number of members (disaggregated by gender and activeness); |
| | number of board members (disaggregated by gender) |
| | number of management staff (disaggregated by gender); |
| | monthly expenditure on wages; |
| | number of cooperatives with marketing and business plans; |
| | annual membership fees/income from membership fees; |
| | presence of audited financial statements for the last 3 years; |
| Table 42 - Description of | f institutional level indicators assessed |

4.2.11.2. Dairy Farming Household Level Outcomes

In this analysis, we test the following theory of change at the farmer level:

- 1. Farmers receive training on best farm practices and hygienic milk handling
- 2. Farmers apply the lessons from the training
- 3. They deliver good quality milk and increase farm productivity
- 4. Farmers sell to multiple markets at attractive conditions
- 5. Farmers sell more milk and at higher prices, also due to the new coolers at the cooperatives
- 6. They make larger profits
- 7. They increase their production capacity (herd size)
- 8. Their income increases and they employ more people

The impact assessment at dairy farming household level was made using a difference-in-difference (DID analysis. Indicators in the following themes were assessed at household level: membership and training dairy production, utilization and expenditure; expenditure on dairy production, farm employment, dairy income, wealth, food security as well as nutritional status.

In the assessment of the indicators in the various themes, comparison between control and treatment group was based on average values. Certainly, the distribution of the treatment and control groups may differ in the outcome variable prior to interventions. Likewise, it should not be a surprise that the treatment and control groups (exposed and unexposed, respectively) might have non-identical outcomes i.e. means or proportions at the baseline. Fortunately, the DID analysis is able to deal with these differences in the distribution of outcomes in treatment and control group. In other words, the approach takes into account differences in initial starting points of elements in the treatment and control group by comparing each group with itself at the various stages of the evaluation. In the assessment, the difference is interpreted as the change in the outcome due to exposure of the intervention compared to the expected outcome had there been no exposure i.e. the counterfactual outcome.

Section 4.4.3 provides the statistical model description.

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4.2.11.3. Qualitative Data Analysis

Data obtained from the FDGs was recorded using both recorders and written notes taken during the discussions. Subsequently, the data was transcribed word-for-word (verbatim) and recorded using a master sheet based on the emerging themes. The emerging themes were based mainly on: First similarities and differences derived from the transcribed notes; Second, thematic areas guiding the qualitative data collection. As earlier indicated, the interview guide for the qualitative data was derived from the quantitative results for each of the thematic areas in the questionnaire. Subsequently, the information obtained from the master sheet was adopted in providing an in-depth understanding of the findings generated from the quantitative results. In other words, the qualitative results were used in explaining the quantitative results.

4.3. Results at the cooperative level

Dairy farmers in the treatment and control areas are organized into co-operatives. The cooperative societies in the treatment area form the Uganda Cranes Creameries Co-operative Union (UCCCU) – ar institution governing milk production in the region. UCCCU was registered in 2005 as a three tire Dairy co-operative: First, UCCCU functions as an umbrella organization of dairy co-operative unions at the district level and finally the primary cooperative societies. As earlier indicated, UCCCU comprises of sever co-operative unions and 128 primary cooperative societies. In other words, it serves all dairy farmers in the south-western region.

The main focus of this section is on cooperatives' responses to the treatment. The cooperative level analysis is presented in sections 4.3.1 (key questions), 4.3.2 (description of treatment), 4.3.3 (descriptives from the survey) and 4.3.4 and 4.3.5 (regression framework and results).¹⁹¹

4.3.1. Research questions

The key questions at the cooperative level are:

a. Do cooperatives manage to obtain better sales prices due to the installation of the coolers? The underlying assumption is that this could arise because of the coolers cooperatives have a better negotiating position vis-à-vis traders.

b. Are cooperatives able to trade in larger volumes due to the installation of the coolers? For example, without coolers evening milk cannot be kept at the collection centres before transport. The coolers could thus cause larger volumes to be bought and sold.

c. Have efficiency gains been achieved by cooperatives as a result of the coolers, other machines and training? We assess possible effects on wastage of milk.

d. In case we find positive effects under a, b and or c: do we see higher prices and/or volumes for farmers and/or higher personnel costs as a result of more hired labour?¹⁹²

Section 4 presents further analysis on the impact on farmers.

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¹⁹¹ NB A number of data quality issues were encountered in the cooperative survey data. These were discussed with IOB and a way forward was jointly established. These limitations include: missing cooperative cases in both endline and baseline (see Table 1); missing values in the monthly price/quantity time series; missing information on training interventions from the cooperative survey. Netherlands Development Organisation (SNV) has kindly assisted in improving/confirming the cooler intervention data (aBi-Trust). We also thank the Dutch Embassy for providing us with up to date information on the cooler installation status.

¹⁹² We have no data for analysis on loan repayments, higher cooperative asset/equity levels, higher profit sharing or higher payment to UCCCU.

4.3.2. Treatment and sample

The unit of observation for the aBi-Trust cooler treatment analysis is the cooperative. The assessment in the subsequent sections is not disaggregated by assigned treatment-control area due to a relatively smal number of dairy cooperatives in the control region. At the baseline, the control region was made of only five cooperatives; however, one of the cooperative societies was disintegrated at the end line. Therefore collection of institutional data in the control area at the end line was done in only two cooperatives. Therefore, the number of completed questionnaires obtained from the control region cannot suppor comparison by the treatment status that was assigned before the baseline.

As a solution to this issue, we looked for a definition of treatment that reflects a change in treatmen status between baseline and endline survey. In other words, the installation of a new aBi-Trust coole between baseline (April 2014) and end line (July 2016) is used as a treatment indicator in the cooperative level analysis. By doing this, we exploit that fact that some of the assigned treatment cooperatives did no receive an aBi-Trust cooler, so that they are categorized at a control cooperative using the alternative treatment definition.

Data on the cooler treatment comes from so-called "cooler installation updates"; these are programmed data provided by the Embassy. These data show a total of 85 cooperatives that received new coolers, or which 36 are in the survey sample. Of these 36 cooperatives, 25 received the cooler between baseline and endline surveys and 11 cooperatives received the cooler in March 2014, at the time when the baseline was implemented.¹⁹³ Since there is a delay between the time of installation and the time of full functionality we can assume that all coolers were functional only after the baseline survey. This means that the programme did not yet influence the baseline measurements. Therefore, these 36 cooperatives are all effectively in the treatment group according to our definition. The control group consists of 92 cooperatives, of which 2 are assigned control cooperatives and 7 are assigned treatment cooperatives that did not receive an aBi-trust cooler.

We do not have sufficient data to say whether a programme cooler installation is a replacement. However the aBi-Trust cooler intervention was targeted towards cooperatives that previously had few if any coolers. We will therefore in the remainder of the study assume that the aBi-Trust coolers in 2014 were additiona coolers, not replacements. This assumption only has implications for the cooler situation description in Table 44, not for the results of the analysis (see section 4.3.4).

The remainder of this section summarises our cooperative sample. The data presented in Table 44 are from SNV administrative data, not from the survey. These intervention data are used to define treatment status in our analysis. The study sample has a total of 45 unique cooperatives: 36 treatment cooperatives as explained above and 9 control cooperatives. At endline, all 36 treatment cooperatives had at least one aBi-Trust cooler.

The lower panel in Table 44 shows the large impact of the cooler treatment on cooler capacity in the treatment group. The average number of coolers increases from 0.1 to 1.4 in the treatment group. The cooler capacity increases by more than 4500 litres on average, from a baseline capacity of about 500 litres. Cooler capacity also increases in the control group, but far less than in the treatment group.

| | 2014 | 2016 |
|--|------|------|
| Number of cooperatives | 45 | 45 |
| Number of cooperatives that had no coolers | 32 | 0 |
| (based on assumption) | | |
| Number of cooperatives that had aBi-Trust | 0 | 36 |

¹⁹³ All coolers but one are installed before July 2015. That one cooler was not yet installed at the time of collection of the cooler update data.

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| coolers | | | | |
|--|--------------|----------------|------------|-----------|
| Number of cooperatives that had Sameer coolers | | 6 | | 8 |
| Number of cooperatives that had other coolers* | | 8** | | 12** |
| | Control | Treatment | Control | Treatment |
| Total number of cooperatives | 9 | 36 | 9 | 36 |
| Total number of coolers | 15 | 4 | 18 | 51 |
| Average number of coolers | 1.6 | 0.1 | 2 | 1.4 |
| Total cooler capacity (litre) | 45950 | 19000 | 63050 | 183350 |
| Average cooler capacity (litre) | 5106 | 528 | 7006 | 5093 |
| Percentage average capacity increase | | | 37% | 865% |
| Total number of aBi-Trust coolers | 0 | 0 | 0 | 41*** |
| Total number of Sameer coolers | 5 | 3 | 3 | 6 |
| Total number of other coolers* | 10 | 1 | 15 | 4 |
| Number of surveyed cooperatives | 4 | 25 | 8 | 29 |
| * These are donated by other organizations of cooperative | or bought by | a trader or tl | he owner o | f the |

** Number of cooperatives with no coolers, aBi-Trust coolers, Sameer coolers and other coolers do not add up to 45 because some cooperatives have coolers from several sources. *** Three cooperatives received two coolers and one received three coolers.

Source: SNV administrative data for cooperatives that have been sampled Table 44 - Cooperative and cooler data

4.3.2.1. Characteristics of Dairy Cooperative Societies

The characteristics of the cooperatives are described below, without distinguishing between treatment and control. The comparison between treatment and control is described later in section 4.3.2.2.

Membership

Overall, the median number of active primary co-operative members at the baseline and end line was 40 (range 10 - 200) and 40 (range 15 - 246) dairy farmers, respectively. The median number of non-active members increased from 17.5 (range 0 - 190) at the baseline to 19 (range 0 - 130) members at the end line. The results demonstrate that co-operative membership at the baseline and end line was predominantly made-up of active members i.e. those that regularly deliver milk to the dairy co-operative.

Similar to the composition at the baseline, membership to the cooperatives was predominantly male. The low membership of females could be attributed to the predominantly male-headed structure tha characterize household headship in the country in general and study area, particularly. Nevertheless, the median number of active members who were females increased from 3.5 (range 0 - 40) to 5 (range 1 - 55 at the baseline and end line, respectively.

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| Membership | | Baseline | | | End-line | | |
|------------|--------|----------|-----|--------|----------|-----|--------|
| | | Min | Max | Median | Min | Max | Median |
| Active | | | | | | | |
| | Male | 10 | 160 | 29 | 1 | 191 | 33 |
| F | Female | 0 | 40 | 3.5 | 1 | 55 | 5 |
| | Total | 10 | 200 | 40 | 15 | 246 | 40 |
| Non-Active | | | | | | | |
| | Male | 0 | 146 | 11 | 0 | 60 | 11 |
| F | Female | 0 | 44 | 0 | 0 | 21 | 1 |
| | Total | 0 | 190 | 17.5 | 0 | 130 | 19 |

Table 45 - Summary statistics on composition of cooperative societies

Note. Assessment is made across cooperative societies in treatment and control area

Equipment and Ownership

Dairy cooperative societies were asked to identify assets they had in their possession at the baseline and end line stages. The results according to Figure 26 present the predominant assets possessed at the baseline and end line to be: land, building, metallic cans and milk testing kit. Worth noting is the increase in proportion of cooperative societies with metallic milk cans and milk testing kits. In particular, the proportion with milk testing kits increased from 81% at the baseline to 100%; while the proportion with metallic milk cans increased from 81.5% to 91.7%, respectively. This increase could be attributed to the intervention through the provision of equipment.



Figure 26 - Distribution by possession of the following assets at the cooperative society

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Note that cooler equipment is let out of this figure as we used administrative data, not survey data, to describe the results on cooler capacity in Table 45.

Maintenance and/or Servicing of Equipment

Managers of dairy cooperative societies were asked how often the coolers were maintained and/or serviced. The maintenance comprised, however was not limited to the following aspects: checking the temperature gauge, rotating paddles, compressors. In the results according to Figure 27, the predominant durations of maintaining and/or servicing the coolers at the baseline were quarterly (35.3%) and monthly (29.4%). However, the predominant durations at the end line were bi-annually (32.3%) and annually (25.8%). Hence, coolers were maintained less frequently on average at the end line when compared to the baseline stage.



Figure 27 - Frequency of maintaining or servicing the coolers

Operation of Equipment

The operations of dairy cooperative equipment assessed in this section were in regard to coolers and generators. Cooperative societies were asked: First, the source of power for the coolers; second, whether or not any of the coolers and generator were non-operational during the past 12 months prior to the survey. Figure 28 and Figure 29 present a distribution by power source and items that were non operational in the past 12 months prior to the survey, respectively.

In the results, the predominant source of power for the coolers at the baseline and end line were generators. The proportion using generators at the baseline and end line were 70.0% and 88.6% respectively.

Regarding equipment that are non-operational in the past 12 months prior to the survey, the results show the main items to be generators, coolers and milk delivery tanks. The illustration demonstrates ar increase in the proportion of these items that were non-operational. No assessment was made for milk delivery and refrigerated trucks because the cooperative societies using the items was relatively small.

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Figure 29 - Distribution by items which were non-operational in the past 12 months prior to survey

Milk Handling and Testing

Regarding milk handling and testing, Figure 30 shows no major variations in the distribution by tests they carry-out on the milk received between the baseline and end line. The illustration presents the major tests to be lactometer, alcohol and organoleptic tests.

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Figure 30 - Distribution by tests carried-out on milk received at cooperative

Other services offered by Cooperatives

Apart from milk trading, cooperative societies were asked to mention other services they were offering to their members or suppliers. In the results according to Figure 31, the predominant services offered to members in addition to milk trading are training or extension services, drug and input shop as well as credit facilities. The treatment includes a service that offers credit to the members of the dairy cooperative society based their accruing milk deliveries. With the exception of credit facilities, the proportion offering the rest of the services reduced at the end line when compared to the baseline. In particular, the proportion offering credit facilities increased from 37.5% at the baseline to 40% at the end line.

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Figure 31 - Distribution by services offered by dairy cooperative societies other than milk trading

4.3.2.2. Baseline balance

Table 46 provides descriptives from the cooperative survey for the baseline by treatment status. For each variable the mean, standard deviation (in parentheses) and the number of observations are provided (in square brackets). The p-values in column 3 give the significance of the difference between the *baseline* values (a value below 0.1 would suggest a significant difference).

Recall from Table 44 that only 4 of the 9 control cooperatives and 25 of the 36 treatment cooperatives were surveyed at baseline. The number of observations in Table 46 show that the survey data also contain missing values for those cooperatives as the number of observations are often lower than 4 or 25.

Despite the low number of observations, we find some sizeable and significant mean differences. For example, the treatment cooperatives have a relatively small membership: on average they have about 40 active members, the controls over 88.

Control cooperatives at baseline also appear to be larger in terms of volumes bought, sold and profit. Ir itself this is plausible. However, note that for a number of variables means have been calculated based or only a few cooperative observations, sometimes just one. This means that the standard diff-in-diff would rely on just one or two control group observations in a survey round, for example at baseline. Also due to the missing data and measurement error, unusual results arise such as a larger mean volume sold thar mean volume bought. As a result, we have replaced the standard differences-in-differences analysis by a time-series analysis that exploits the month of cooler receipt and monthly data on volumes and prices.

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| | Basel | ine | |
|---|------------------|-------------------|----------|
| | Control | Treatment | p-value |
| Active members | 88.50 | 40.35 | 0.012** |
| | (75.72) | (21.10) | |
| | [4] | [23] | |
| Non-active members | 43.25 | 32.82 | 0.688 |
| | (30.91) | (49.17) | |
| | [4] | [22] | 0 - |
| from formers | 0.00 | (0.22) | 0.389 |
| from farmers | (0.00) | (0.42) | |
| Mean Volume bought per month ¹⁹⁴ | [3] 82.075.50 | [23] 27 577 48 | 0.008* |
| Mean volume bought per month ?? | $(15\ 521\ 70)$ | (36,026,68) | 0.090 |
| | [2] | [20] | |
| Mean Volume sold per month | 144,866.19 | 28,066.52 | 0.000*** |
| ĩ | | (23,697.70) | |
| | [1] | [16] | |
| Price paid per litre | 719.46 | 657.55 | 0.095* |
| | (113.90) | (39.92) | |
| | [2] | [18] | |
| Price received per litre | 814.17 | 708.90 | 0.274 |
| | [-1 | (89.44) | |
| Fraction of cooperatives that sold mills to | [1] | [15] | 0.408 |
| Sameer in the past 12 months | 1.00 | (0.50) | -0.430 |
| Sameer in the past 12 months | [1] | [16] | |
| Price received from Sameer | 814.17 | 711.18 | 0.431 |
| | 1, | (117.86) | |
| | [1] | [9] | |
| Annual gross profit from dairy* | 59,770.79 | -2,390.88 | 0.000*** |
| | | (5,647.07) | |
| | [1] | [13] | |
| Mean share in sales to direct customers | 0.00 | 0.18 | 0.523 |
| | F.1 | (0.27) | |
| Mean share in color to Company | [1] | [16] | 0.106 |
| Mean share in sales to Sameer | 1.00 | (0.41) | 0.196 |
| | [1] | [16] | |
| Mean share in sales to other processors | 0.00 | 0.12 | 0 707 |
| ficult share in sules to outer processors | 0.00 | (0.34) | 0.707 |
| | [1] | [16] | |
| Mean share in sale to traders | 0.00 | 0.28 | 0.479 |
| | | (0.37) | |
| | [1] | [16] | |

¹⁹⁴ The main function of this Table is to show what data is available. The data on volume of milk bought and sold is only available for two and one cooperatives respectively, which is not representative for the control area (9 cooperatives). Therefore, comparing the control and treatment values for volumes bought and sold gives biased results. A limited control group does not affect the time series analysis, as we use the months without coolers of all the cooperatives (both treatment and control) as control values.

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| | Basel | Baseline | | |
|---|-----------------------------|------------------------------|-------|--|
| Yearly membership fee | 10.00 (10.00) [2] | 74.50 (124.85) [16] | 0.394 | |
| Average monthly expenditure on wages during the last 6 months | 690.00 (1,134.77) [3] | 873.33 (1,536.80) [15] | 0.848 | |
| Number of employees | 36.00 (24.33) [3] | 23.61 (20.95) [23] | 0.352 | |

* Calculated by subtracting value of purchased milk from the value of milk sold. The value of purchased milk was calculated by multiplying the volume of milk bought with the price of milk bought. The value of milk sold was calculated by multiplying the volume of milk sold with the price of milk sold separately for each client, then adding up those values. Note: standard deviation between parentheses and sample size between brackets. **Source: Cooperative survey data merged with administrative data**

 Table 46 - Cooperative survey descriptives

4.3.3. Methodology of time series cooler analysis

The cooperative level surveys include a section that tracked milk prices and quantities (both purchased and sold) for the twelve months preceding the interview. We use these data to analyse the impact of the aBi-Trust cooler installation. In this analysis, we will also look into the prices and volumes for specific groups of partners (Sameer, processors, traders and direct consumers).

Specification

We consider a cooperative part of the treatment group if it received an aBi-Trust cooler according to administrative data. UCCCU installed the first coolers in March 2014, but we assume that it takes one month for a cooler to become fully functioning, so that the treatment started after the baseline survey in April 2014. According to this treatment definition, 36 cooperatives are part of the treatment group.

We use the following regression specification for cooperative c at time t with cooperative fixed effects:

$$y_{c,t} = \beta_0 + \beta_1 COOLERDUMMY_{c,t} + \beta_t MONTHDUMMY_t + v_c + \varepsilon_{c,t}$$

Where COOLERDUMMY is one for the months in which the aBi-Trust cooler was functioning MONTHDUMMY are dummies for each of the months between April 2013 and March 2014 and between July 2015 and June 2016, v_c are cooperative fixed effects and epsilon is the error term. Both treatment and control cooperatives are included in the regressions. The control cooperatives add to the estimation through the month dummies.

The specification we use allows for a monthly (seasonal) effects on volumes and prices, and for cooperative idiosyncratic differences. The coefficient of interest is $\beta_{i,}$ the parameter on the cooler treatment dummy that for each cooperative "switches on" in the month that a functional aBi-Trust cooler is present. Hence, the model is identified on the basis of the variation in the month in which the cooler was delivered. As outcome variable y, we use monthly volume and price data. The price regressions are weighted by the corresponding volumes.

In addition, we analyse whether it takes time for the treatment to become effective by distinguishing between the effect of the coolers on volumes and prices within 12 months after installation and after 12

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months after installation¹⁹⁵. For this, we estimate the following for cooperative c at time t with cooperative fixed effects:

- $y_{c,t} = \beta_0 + \beta_1 COOLERDUMMY$ (installed in past 12 months)_{c,t}
 - + β_2 COOLERDUMMY (installed more than 12 months ago)_{c,t} + β_t MONTHDUMMY_t + v_c + $\varepsilon_{c,t}$

This way, we can compare a direct effect from the coolers with a delayed effect.

Data

In the survey, the cooperatives were asked about monthly volumes of milk bought and sold and the corresponding prices for the 12 months before the baseline survey in April 2014 and the endline survey in July 2016. Hence, the data contains information for two periods: April 2013 to March 2014 and July 2015 to June 2016. The volumes and prices of milk sold are recorded separately for sales to Sameer, processers traders and direct customers.

Figure 32 and Figure 33 provide some insight into the time series data of the volumes and prices of mill bought and sold by the cooperatives that received at least one aBi-Trust cooler. Each figure contains two graphs to make clear that there are 15 months in between the trends. Note that the values of the months before the aBi-Trust coolers are from 16 cooperatives, while the months after are from 26 cooperatives¹⁹⁶ Missing values in the data are further discussed after these figures. The figures show that prices fluctuate less, that the difference between the volume of milk bought and sold decreased and that cooperatives sel more milk after installation of the coolers. Section 3.4.2 discusses whether the latter is a significant treatment effect from the coolers.

¹⁹⁵ In the endline data between July 2015 and June 2016, we have 432 months in total for the treatment cooperatives (12 months for each of the 36 treatment cooperatives). In 129 of these months, coolers were installed in the past 12 months and in 302 of these months, coolers were installed more than 12 months ago. For one cooperative the cooler was not installed yet at the time of the administrative data collection in June 2015. We assume that this cooler was installed in July 2015, so that there is one month for one treatment cooperative in the endline data that no cooler was installed yet.

 $^{^{196}}$ For the months before the aBi-Trust coolers, we have 14 to 16 observations, while we have 24 to 26 observations for the months after installation of the coolers.



Figure 32 - Price of milk bought and sold by cooperatives that received an aBi-Trust cooler



Figure 33 - Volume of milk sold by cooperatives that received an aBi-Trust cooler

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Unfortunately, the data are not complete. Cooperatives have differing patterns of missing data: some are missing all baseline observations, some the complete end line, and for some cooperatives data is missing just for certain months. For 24 cooperatives out of the 45 either baseline or endline observations are missing. Also, some cooperatives have data on volumes and prices of milk sold, but the data are no consistent. For example, volumes are recorded for sales to Sameer while prices are for sales to processors.

To deal with part of these missing values, we impute data gaps when data was available for at least six months out of 12 months before baseline or end line.

We assume that there were purchases and sales of milk every month, so that volumes are missing if there are no volumes specified for any purchaser. In addition, we assume that when both volume and price data on milk sold is missing for a certain purchaser, but they are available for another, there were no sales to the former. That observation is then set to zero. Note that compared to months without an aBi-Trus cooler, the fraction of months without sales out of all monthly observations is larger for months with aBi Trust cooler, as shown Table 47. If the cooperatives did sell milk in these months, the results for volume o milk sold and milk revenues are likely to be biased downward because the assumption implies that in the months with an aBi-Trust cooler, the cooperatives experienced more months without milk sales.

| Percentage of months without sales to [] | Months without aBi- Trust cooler | Months with aBi-Trust cooler |
|--|-------------------------------------|---------------------------------|
| Direct customers | 23.2 | 40.4 |
| Sameer | 20.2 | 33.9 |
| Other processors | 29 | 32.7 |
| Traders | 27 | 44.3 |

 Table 47 - Months without sales specified by client (according to assumption)

The method we use for the imputation is predictive mean matching¹⁹⁷, which randomly draws each imputation from five nearest neighbours as estimated by linear prediction.¹⁹⁸ In most of the cases, we were not able to impute the missing data because we did not have enough data to impute from (Table 48).

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¹⁹⁷ When the normality assumption is violated (normality rejected for all variables of interest but the price paid to traders using a Skewness/Kurtosis tests for Normality), predictive mean matching might be more appropriate than a regressions method as it ensures that imputes values are plausible. Source: Horton, N.J. & Lipsitz, S.R. (2001). Multiple imputation in practice: Comparison of software packages for regressions models with missing variables. The American Statistician, 55(3), pp. 244-254.

¹⁹⁶ Some months were imputed manually. When sales to a certain purchaser were zero in eleven months, and the twelfth month is missing, the latter was imputed with zero if the price for that month and purchaser was not specified either (14 months imputed). In addition, for two cooperatives, there was no variation in the price received from certain purchasers. As the imputation method needs this variation for the linear regressions, the missing months (8 months in total) were imputed with the fixed price in the other months.

| <i>Total number of months</i> (24 per cooperative) | 1080 | 1080 | | |
|---|-----------------------|-----------------------|---|--|
| | Percentage missing | Percentage imputed | Number of cooperatives with non- missing data (45 in total)*** | Mean number of months with non-missin data per cooperative (max. 24) |
| Volume bought | 44.3 | 1.57 | 42 | 13.8 |
| Price of volume bought | 49.0 | 1.39 | 41 | 12.6 |
| Total volume sold* | 54.2 | 0.47 | 33 | 11.1 |
| Mean price of volume sold** | 54.6 | 0.83 | 34 | 11.1 |
| Volume sold to direct consumers | 55.8 | 0.93 | 32 | 10.8 |
| Price of volume sold to direct consumers | 59.3 | 0 | 11 | 3.0 |
| Volume sold to Sameer | 57.5 | 1.76 | 33 | 10.6 |
| Price of volume sold to Sameer | 56.3 | 0.46 | 21 | 5.2 |
| Volume sold to processors | 57.6 | 1.48 | 32 | 10.5 |
| Price of volume sold to processors | 54.1 | 0.83 | 21 | 4.7 |
| Volume sold to traders | 55.4 | 0.83 | 33 | 10.9 |
| Price of volume sold to traders | 59.4 | 0.46 | 11 | 2 |

* Sum of sales to direct consumers, Sameer, processors and traders after those were imputed ** Mean of price received from direct customers, Sameer, processors and traders after those were imputed

*** Note that we should have data for all 45 cooperatives for total volume bought and sold and the corresponding prices and for the volumes sold to the clients. However, prices are also missing if the cooperative did not sell milk to a certain client (if the volume sold to that client is o).

Source: Cooperative survey data

Table 48 - Missing data imputed

4.3.4. Results

4.3.4.1. A. Prices

Table 49 and Table 50 provide price impact estimates (weighted by the corresponding volumes). Each of these provide two columns of estimates: first a specification which assumes that cooler effects are measurable immediately (dummy switches on when cooler is functional); next, the same equation but now with the distinction between a direct effect within 12 months after installation and a delayed effect in the period after that. To put results in perspective, note that the mean buying price for cooperatives in the bottom row is 590 and the mean selling price is about 680, leaving a mean margin of about 90 per litre.

We find a negative effect on price per litre bought. This effect arises within a year after installation of the cooler, but it is no longer significant after that. The rounded impact (in column 1) is -50. This effect represents 8 percent of the mean buying price. The finding can be explained by the loan repayment, which

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the cooperatives withhold from the milk price. Most withhold 100 UGX per litre for the loan repayment and operating the cooler, but this can be reduced to 50 UGX after the loan has been repaid¹⁹⁹. This would explain why the negative effect is larger in the first 12 months after installing the cooler. For the price per litre sold we find no significant effect.

| | (1) | (2) | (3) | (4) |
|--|----------------------------------|----------------------------------|------------------------------------|-----------------------------------|
| | Price per litre bought | | Mean pric so | e per litre ld |
| Cooler in use (1 month after installation) | -48.12* (25.52) | 0 | -14.19 (25.65) | |
| Cooler installed in past 12 months | | -83.07 ^{***} (28.27) | | -35.10 (26.78) |
| Cooler installed more than 12 months ago | | -39.72 (25.53) | | 3.24 (26.39) |
| Constant | 936.05 ^{**} (443.62) | 927.14 ^{**} (440.65) | 1024.61 ^{***} (105.06) | 547.89 ^{***} (128.39) |
| Cooperative fixed effects | Yes | Yes | Yes | Yes |
| Month dummies | Yes | Yes | Yes | Yes |
| Observations | 566 | 566 | 452 | 452 |
| r2 | 0.71 | 0.71 | 0.79 | 0.80 |
| ymean | 591.52 | 591.52 | 680.75 | 680.75 |

Table 49 - Price per litre bought and sold

Standard errors in parentheses. Weighted by volumes. * p < .10, ** p < .05, *** p < .01Source: Cooperative survey data merged with administrative data

Table 50 shows the impact coefficients of the price regressions by client. The complete tables are presented in Appendix E. We only find a significant negative result for the price received from Sameer which is a sustained effect. Hence, we do not find evidence for an improved bargaining position of the cooperatives due to the coolers.

In a similar regression analysis the treatment dummy was replaced by the capacity of the cooler received to account for differences in cooler treatment intensity (results not shown in a table). All cooperatives received aBi-Trust coolers of 3000 or 5000 litres, but in some cases cooperatives received two coolers. In other words, they received 6000 or 8000 litres of cooler capacity. Using cooler capacity as an alternative treatment indicator, we find similar results.

| Price per litre sold to [] | Cooler in use (1 month after installation) | Cooler installed in past 12 months | Cooler installed more than 12 months ago |
|-------------------------------|--|---------------------------------------|---|
| Direct customers | 141.92 | -43.91 | -112.31 |

 199 R. Bensdorp and F. van der Vlugt (2017). Assessment impact cooler at cooperative level. Agriterra.

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| | (99.11) | (113.98) | (94.40) |
|------------------|---------------------|--------------------------|---------------------|
| Sameer | -103.44*** | -104.02*** | -100.71** |
| | (27.77) | (28.59) | (41.04) |
| Other processors | -186.90 | 37.99 | 50.63 |
| | (474.47) | (475.82) | (475.56) |
| Traders/vendors | -134.66 | 0.00 ¹ | -134.66 |
| | (162.70) | (.) | (162.70) |
| Traders/vendors | -134.66 (162.70) | 0.00 ¹ (.) | -134.66 (162.70) |

 1 No observations for price per litre sold to traders in 12 months after installation the coolers. Note: Impact coefficients controlled for month dummies and cooperative fixed effects. Standard errors in parentheses. Weighted by volumes.* p < .00, ** p < .05, *** p < .01

Source: Cooperative survey data merged with administrative data

Table 50 - Price per litre by client

4.3.4.2. B. Volumes

For the volume analysis we look at two indicators: a dummy variable for collecting evening milk and the actual volumes of milk bought and sold. The underlying assumption is that the coolers make it possible to collect evening milk and that this in turn increases the volumes bought and sold.

The results for collecting evening milk are shown in Table 51. A remarkable finding is that at endline no cooperative reports receiving afternoon milk from farmers. This is one of the mechanisms in the theory o change that would allow an increase in volumes but apparently this did not happen. However, collection of evening milk is not yet actively promoted²⁰⁰. In addition, the qualitative findings showed that few farmers have animals that produce large quantities of milk in both the morning and afternoon. Moreover the little milk that is produced in the afternoon is often used for own consumption or the calves.

| | Bas | eline | End | lline | DD coef. | p- value |
|--|---------|---------|---------|---------|-------------|-------------|
| | Control | Treatme | Control | Treatme | | |
| | | nt | | nt | | |
| Fraction that received | 0.00 | 0.22 | 0.00 | 0.00 | -0.217 | 0.254 |
| milk in the afternoon | (0.00) | (0.42) | (0.00) | (0.00) | | |
| from farmers | [3] | [23] | [8] | [29] | | |
| Note: standard deviation between parentheses and sample size between brackets. | | | | | | |
| Source: Cooperative survey data merged with administrative data | | | | | | |

Table 51 - Evening milk

Table 52 presents estimation results of our impact equation for volumes. Columns 1 and 2 give results for volumes bought, columns 3 and 4 for volumes sold. The total volume bought by a cooperative is the sum of milk volumes bought from active and non-active farmer members. Total volume sold is the sum of milk volumes sold to direct customers, Sameer, processors and traders.

The bottom row of the table shows that on average cooperatives buy just over 58,000 litres per month and sell just over 56,000 litres. We find a significant decrease in volume of milk bought in the first six months after installation of the cooler, but this effect does not last. We do not find other significant effects from the cooler on volumes bought or sold. The estimates are imprecise (large standard error) and mostly negative.

The volume impact estimate conclusions do not change qualitatively with cooler capacity as a treatment indicator (results not shown), although the negative effect on volume bought in the first six months after installation of the cooler is no longer significant.

²⁰⁰ R. Bensdorp and F. van der Vlugt (2017). Assessment impact cooler at cooperative level. Agriterra.

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Table 52 showed a large average expansion in cooler volume. But these regression results suggest that this expansion did not translate in increased traded volumes. There are a number of possible explanations First, it may be that the theory of change is correct, that the treatment is effective but that it simply takes time for increased production capacity to translate into higher equilibrium market shares for the treated cooperatives. Part of this may be operational delays in putting coolers to maximum effective use.

Secondly, it should not come as a surprise that there is substantial variation between treated cooperatives in the speed of induced production change, especially in the short run. That is, it is to be expected that not all cooperatives and their members can increase their production at the same speed and this could explain variation around the mean volume bought impact. The same is true for the volumes sold: if there is substantial variation in market share development then the estimate will be imprecise, especially in a small sample.

Third, it could be that cooler capacity was a constraint but only one of a set of binding constraints. With other potential constraints still in place, for example, lack of operational or marketing skills, the increased cooler capacity does not lead to significantly increased volumes. It is also possible that a combination of these factors is at play.

Fourth, although we assumed that the aBi-Trust coolers are additional to the coolers that the cooperatives already had, it is possible that the aBi-Trust coolers were used as replacements. For example, the cooperatives might have used them to replace Sameer coolers. In that case, the cooperatives do not have more capacity than before the treatment. There is indeed some evidence that Sameer collected their coolers from treatment cooperatives, reducing the net cooler capacity treatment.

Fifth, the farmers might prefer to sell their milk to other clients due to the loan repayment deduction from the price that treatment cooperatives offer. Cooperatives can only increase their sales if they can increase their milk purchases. We discuss this further in section 4.

Finally, as mentioned in section 3.3, the assumption that missing values for both the price and volume of milk sold in a certain month for a particular client mean that the cooperative did not sell any milk in that month to that client might create a downward bias in the result for volume of milk sold. The assumption applies to relatively more months with an aBi-Trust cooler compared to months without the coolers.

| | (1) | (2) | (3) | (4) |
|--|---------------------------------|---------------------------|-----------------------|-----------------------|
| | Total volume bought (litres) | | Total volume | sold (litres) |
| Cooler in use (1 month after installation) | -20107.12 (16903.56) | | -949.08 (10303.83) | |
| Cooler installed in past 12 months | | -37295.52** (17856.90) | | -850.14 (10921.48) |
| Cooler installed more than 12 months ago | | -14077.22 (16930.96) | | -985.00 (10397.38) |
| Constant | 42352.05^{*} (25050.23) | 25195.55 (24909.68) | 7345.64 (25302.20) | 7408.06 (25431.72) |
| Cooperative fixed effects | Yes | Yes | Yes | Yes |
| Month dummies | Yes | Yes | Yes | Yes |

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| Observations | 619 | 619 | 500 | 500 |
|--------------|----------|----------|----------|----------|
| r2 | 0.63 | 0.63 | 0.83 | 0.83 |
| ymean | 55616.55 | 55616.55 | 55890.84 | 55890.84 |

Table 52 - Total volume bought and sold

Standard errors in parentheses

* p < .10, ** p < .05, *** p < .01Source: Cooperative survey data merged with administrative data

Table 53 shows impact regression results for volumes sold to direct customers, Sameer, other processors and traders. The complete tables are presented in Appendix E.

There is a strong and highly significant positive effect on volumes sold to other processors. The mean baseline volume sold among treated cooperatives is just over 37,000 litres (see Table 46). The coefficien size in the first column of the table implies over a 50 percent increase in volume sold to other processor relative to the total mean volume sold at baseline. This is likely due to the new Pearl factory that was buil during the same time that the coolers were installed.

The size of the impact is very large, relative to mean sales to other processors (100 percent or more depending on the specification). It is also very large when considering that the added capacity per treated cooperative is only some 4500 litres. In combination with the (largely insignificant) results in the previous tables this suggests a diversion of sales from direct customers, Sameer and traders to "other processors" rather than an increase in production or sales.

As before, the cooler capacity treatment indicator was used in an alternative estimate (results not shown) We find a significant (p<0.1) negative treatment effect on volume sold to direct customers and a more significant decrease in volume sold to Sameer (p<0.05), but no other qualitative changes to the result presented.

| Litres sold to [] | Cooler in use (1 month after installation) | Cooler installed in past 12 months | Cooler installed more than 12 months ago |
|-------------------|--|------------------------------------|---|
| Direct customers | -59.91 | 213.06 | -159.03 |
| | (3484.05) | (3709.93) | (3517.98) |
| Sameer | -12063.49 | -11035.58 | -12481.90 |
| | (9217.81) | (9746.19) | (9315.54) |
| Other processors | 19626.83** | 12443.21 | 22235.05^{**} |
| | (8990.60) | (9522.30) | (9026.85) |
| Traders/vendors | -5003.87 | -2852.20 | -5878.07 |
| | (7968.37) | (8419.82) | (8047.45) |

Table 53 - Litres sold by client

Note: Impact coefficients controlled for month dummies and cooperative fixed effects. Standard errors in parentheses. * *p* < .10, ** *p* < .05, *** *p* < .01

Source: Cooperative survey data merged with administrative data

The remainder of this section discusses the consequences of the findings above for the revenues of the cooperatives. Figure 34 shows the revenue from milk sales for the cooperatives that received an aBi-Trus cooler, calculated by adding up the multiplications of the price and volume of milk sold to each client. The results present a clear increase in revenues between the baseline and end line, after which the revenues show a downward trend.

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Figure 34 - Revenue from milk sales for cooperatives that received an aBi-Trust cooler

Nevertheless, the regression results in Table 54 are negative and significant. Recall that we found a negative but insignificant effect for both the mean price and total volume of milk sold, so that a negative effect is expected. This means that the revenues of the control cooperatives increased even more. Yet we should note that missing values for monthly revenues to specific clients are treated as zero, and that the months with an aBi-Trust cooler have relatively more missing values (see section 3.3). This creates a downward bias in the results in case there were sales in the missing months.

| | (1) | (2) |
|--|--|---------------------------|
| Cooler in use (1 month after installation) | Revenue fro -10238.88*** (3220.31) | m milk sales |
| Cooler installed in past 12 months | | -16332.87*** (3752.59) |
| Cooler installed more than 12 months ago | | -7495.64** (3324.36) |
| Constant | 129280.93*** (5509.59) | 127518.30*** (5514.75) |
| Cooperative fixed effects | Yes | Yes |
| Month dummies | Yes | Yes |
| Observations | 1080 | 1080 |
| r2 | 0.59 | 0.59 |

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| vm | ean | |
|----|-----|--|
| ./ | | |

13804.38 13804.38

Table 54 - Revenue from milk sales

In 1000 UGX. Standard errors in parentheses. * p < .10, ** p < .05, *** p < .01Source: Cooperative survey data merged with administrative data

4.3.4.3. C. Efficiency gains

In order to assess whether the coolers induced any efficiency gains, we analyse the volume of milk that was wasted. This is calculated by subtracting the volume of milk sold from the volume of milk bought for each month. We analyse the volume of milk wasted as a percentage of the volume of milk bought.

There are 500 months for which we have observations for both milk bought and sold, so that the volume of milk wasted could be calculated. However, for 135 months the volume of milk wasted was negative. As this is not possible, these observations were set to missing.

The mean percentage of milk bought that was wasted was 21.2 percent before the installation of the coolers, while it was 14.2 percent after installation of the coolers²⁰¹. Yet, Table 55 shows that the volume of milk wasted as a percentage of volume of milk bought increased after receiving the aBi-Trust coolers. These results should be interpreted carefully because it might be that the most efficient months, i.e. month without any wasted milk, were taken out of the analysis by removing the months with a negative volume of milk wasted.

Note that the constant and the coefficient are larger than 100 when summed up, because of the cooperative fixed effects and month dummies that each have their own coefficients but are not shown.

| | (1) | (2) |
|--|---|--|
| Cooler in use (1 month after installation) | Volume of milk wasted (percentage) 33.51* (18.17) | Volume of milk wasted (percentage) |
| Cooler installed in past 12 months | | 39·57 ^{**} (18.72) |
| Cooler installed more than 12 months ago | | 31.68 [*] (18.20) |
| Constant | 74.81*** (23.30) | 51.67* (29.46) |
| Cooperative fixed effects | Yes | Yes |
| Month dummies Observations | Yes 365 | Yes 365 |
| r2 | 0.53 | 0.53 |

 201 The mean percentage of milk bought that was wasted of both periods was 18.1 percent, as shown in the bottom row of Table 52.

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ymean

18.07

18.07

Table 55 - Volume of milk wasted

Standard errors in parentheses

* p < .10, ** p < .05, *** p < .01Source: Cooperative survey data merged with administrative data

Note: The constant and the coefficient are larger than 100 when summed up, because of the cooperative fixed effects and month dummies that each have their own coefficients but are not shown.

4.3.4.4. D. Beneficiaries of positive results

The results above suggest that the coolers did not have a positive impact on the cooperatives. Therefore we do not expect to find higher prices or volumes for farmers or higher personnel costs. In fact, recal from Table 46 that the price paid by the cooperatives to suppliers even decreased. Consequently, we also do not find a significant effect on personnel costs (results not shown).

4.3.4.5. Qualitative findings

Despite the lack of quantitative evidence for the programme logic at the cooperative level, the qualitative findings are positive.

From the qualitative interviews with the treatment group, participants affirmed that the acquisition of cooling and handling equipment enabled the cooperative societies to utilize a more effective and efficient system of cooling milk. In other words, cooling efficiency increased by threefold with milk chilling time reducing from nine to three hours. This significantly reduced the operational costs of the cooperative societies particularly expenditure on fuel and related costs. This was not the case prior to the acquisition of the equipment where the co-operative societies were hiring cooling machinery from one milk processor under very suppressive terms and conditions.

Earlier the farmers were depending on coolers which were for Sameer. So when Sameer could buy, he would give the farmers any amount he wants; and farmers would get discouraged. Now the presence of these coolers, the equipment is very efficient in fuel consumption and chilling milk. So if the farmer has this milk, he can sell it to any other person he wants rather than the other time when the milk sale was being tagged to Sameer (Interview with UCCCU, Mbarara). When the chilling costs are low, that means the union will be able to earn more commission and it will subsequently increase on farmers pay (FGL with members Sheme Cooperative Society).

Another impact on these coolers, at-least when we compare the operations concerning electricity and diesel, we are seeing that at-least these equipment are consuming little.... And the most thing that this coolers have reduced are the burdens on unions; at first we were hiring the coolers, we were paying a million per year which is a lot of money compared to the income of the union (FGD with members).

Further, acquisition of the equipment addressed the issue of limited cooler capacity at the MCCs; thus reducing milk wastage during the milk abundant seasons. The coolers acquired through the intervention were of a higher capacity (3000 and 5000 litres) compared to the previous ones which were hired ones (1500 litres). The higher capacity therefore ensured that all milk delivered to the cooperative societies through the MCCs was received in the morning and afternoon hours.

Further, the acquisition of modern cooling equipment provided dairy cooperative societies with better storage facilities for their milk. As a result, the cooperative societies were able to negotiate for higher milk prices due to the longer shelf life of the acquired milk cooling and handling equipment. The professionalization of member's farming practices was successful in improving post-harvest milk handling from the farms to the Milk Collection Centres (MCCs); thus reducing milk waste due to poor handling

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Collectively, these practices have increased farmer income from milk and consequently improved their livelihood.

....and when they brought the coolers, we have been able to at-least to negotiate prices. Because before we had coolers from Sameer, so they would come and dictate prices; they would say because you are having our coolers, we would not refuse (FGD with Members Sheme Cooperative Society).

While these respondents indicate that they experienced positive results from the acquisition of the coolers, the quantitative analysis cannot confirm these results at the mean level for the whole treatment group.

4.3.5. Conclusion

The cooperative level impact analysis of monthly volume and price data gives a number of significant results. The effect of the coolers on aggregate volumes bought and sold and collection of evening milk is not significant, but we do find quite substantial diversion of trade towards "other processors". This is likely to be due to the Pearl processor that was build. Moreover, the data confirm that the cooperatives deduct the loan repayment for the coolers from the price of milk paid to the farmers, but we do not find ar effect on the price of milk sold. This suggests that the coolers did not increase the bargaining power of the cooperatives between the baseline survey and the end line survey. Looking at client specific prices, we find that prices of milk sold to Sameer decreased, while the effects for other clients were insignificant. Taking the prices and volumes of milk sold together, we find a negative effect on milk revenues.

4.4. Results at the farmer level

Even though we do not find any positive effects from the cooler acquisition at the cooperative level, we analyse the impact from the programme on the farmers. Additional to the equipment that the cooperatives received, the programme included training at the farmer level.

This chapter further discusses the treatment definition and implementation (4.1), the baseline balance (4.2), methodology (4.3) and the results (4.4 and 4.5).

4.4.1. Treatment

4.4.1.1. Treatment definition

The treatment at the cooperative level consists of the professionalization of their member's farming practices, strengthening of dairy cooperatives and unions, increased farmer's access to financial services access to better storage facilities for their produce (coolers) as well as increased demand through better access to markets. These treatment cooperatives are members of UCCCU, while control cooperatives are not. Farmers that are living around these cooperatives are also expected to benefit from this treatment and are included in the sample. In this section, we call the analysis that assesses the impact on this group the 'UCCCU cooperative effect analysis'.

However, as discussed in section 3.2, we find that not all the cooperatives received treatment as planned As a result, the treatment effect using the UCCCU treatment definition will be underestimated. Therefore similar to the analysis at the cooperative level, we use the installation of one of more coolers to identify which cooperatives and farmers did actually receive treatment²⁰². In this case, the treatment group consists of farmers who live around cooperatives that received at least one aBi-Trust cooler. The other cooperatives are part of the control group. We call this analysis the 'Additional cooler effect analysis'.

 $^{^{\}rm 202}$ We do not have data on training at the cooperative level, so we cannot estimate a separate treatment effect of the training.

As we do not know why some cooperatives from the UCCCU treatment group did not receive a cooler, the 'additional cooler treatment effect' might be biased due to selection into treatment, i.e. this treatmen effect is true for the 'additional cooler' treatment cooperatives in the sample, but the effect might not be generalizable.

Hence, we do two separate analyses in this chapter:

- 'UCCCU cooperative effect analysis', using the treatment status that was assigned to the farmers at the cooperative level (the cooperative around which they live) before the baseline survey. This is "planned treatment", not taking into account any changes during implementation, and includes the training as discussed above and receipt of one or more coolers.
- 2. 'Additional cooler effect analysis', using the realized treatment based on the acquisition of at leas one aBi-Trust cooler by the cooperatives around which the farmers live according to administrative data. The coolers were installed between March 2014 and June 2015, but due to a delay between installation and use, we assumed that all coolers were fully functional after the baseline survey in April 2014. The cooler installation should be complemented with training, bu as discussed above we do not have data to check this.

4.4.1.2. Data

We include all data from the farmer survey. The baseline data includes 840 farmers, and 700 of them were surveyed again at endline. These farmers are living around 43 cooperatives, of which two are assigned control cooperatives.

Only 11 farmers could not be linked to cooperative data. These farmers are included in the analysis of the first treatment definition, but had to be excluded from the analysis of the second treatment indicator, as the latter requires a merge with administrative data at the cooperative level. Table 56 provides are overview of the farmer data by treatment status.

Of these 43 cooperatives, 32 are included in the cooperative survey data used in the previous section Fortunately, the administrative cooler installation data from the Dutch Embassy contains data for al cooperatives included in the programme, so that the treatment status of these cooperatives according to the second treatment indicator could still be determined.

| | Baseline | Endline | | |
|--|----------|---------|--|--|
| 'UCCCU cooperative effect | | | | |
| analysis' | | | | |
| Number of control farmers | 370 | 310 | | |
| Number of treatment farmers | 470 | 390 | | |
| | | | | |
| Additional cooler effect | | | | |
| analysis | | | | |
| Number of control farmers | 430 | 346* | | |
| Number of treatment farmers | 410 | 343* | | |
| * 11 of the 700 farmers could not be linked to a cooperative, and also not to a baseline | | | | |
| farmer. Hence, these are excluded from the sample for analysis of ex post treatment. | | | | |
| Source: Farmer survey data merged with administrative cooperative data | | | | |

Table 56 - Number of farmers by treatment status

4.4.1.3. Treatment received

The treatment received in the form of coolers at the cooperative level is already discussed in the previous section. Table 57 shows the fraction of farmers that received training. Note that these are trainings in
general, including aBi-Trust trainings. The first indicator was asked directly to the farmers, while the second indicator is composed of questions about training in pasture production, animal health management, animal breeding, general dairy hygiene, animal nutrition, vaccination skills, value addition and milking skills. If the farmer had training in any of those topics, the second indicator was set to a value of one.

For both indicators we see that the treatment group did receive more training, but the farmers did not receive more training than usual between baseline and endline.

| | Control | | Treatment | | |
|--|----------------|----------------|----------------|----------------|--|
| | Con | uoi | ITeatilielit | | |
| | Baseline | End line | Baseline | End line | |
| Training on improved dairy/crop husbandry in the past 12 months | 0.31 (0.46) | 0.24 (0.43) | 0.47 (0.50) | 0.44 (0.50) | |
| | [370] | [301] | [470] | [384] | |
| Received training in any dairy farmer skill in the past 12 months | 0.35 (0.48) | 0.29 (0.46) | 0.52 (0.50) | 0.56 (0.50) | |
| | [370] | [301] | [470] | [384] | |

Note: standard deviation between parentheses and sample size between brackets. **Source: Farmer survey data**

Table 57 - Training received by treatment group in 'UCCCU cooperative effect analysis'

Section 4.4.4.1 elaborates on the training received by the treatment farmers.

Table 58 shows what part of the assigned UCCCU treatment group actually received treatment. In other words, it shows what part of the 'UCCCU treatment group' forms the 'additional cooler treatment group' Out of the 43 assigned treatment cooperatives, 36 received an aBi-Trust cooler. This is equivalent to 87.2 percent of farmers from the UCCCU treatment group. None of the cooperatives in the control area received coolers.

| | Control | Treatment | | | |
|--|---------|-----------|--|--|--|
| Percentage of cooperatives that received a cooler | 0 | 83.7 | | | |
| Percentage of farmers that live around a cooperative that | 0 | 87.4 | | | |
| received a cooler | | | | | |
| Source: Farmer survey data merged with administrative cooperative data | | | | | |

Table 58 - Treatment received by treatment group in 'UCCCU cooperative effect analysis'

Table 59 presents the same results as in Table 58, but for the 'additional cooler treatment group'. The difference in training received between treatment and control is similar using this treatment definition. Even though a similar fraction of the control farmers participated in trainings as treatment farmers, the treatment farmers participated in more trainings between baseline and end line than the control farmers.

| | Con | trol | Treat | ment |
|---|----------|----------|----------|----------|
| | Baseline | End line | Baseline | End line |
| Training on improved dairy/crop | 0.42 | 0.27 | 0.47 | 0.45 |
| husbandry in the past 12 months | (0.49) | (0.44) | (0.50) | (0.50) |
| | [430] | [346] | [410] | [339] |
| Received training in any dairy farmer skill | 0.47 | 0.39 | 0.52 | 0.57 |

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| in the past 12 months | (0.50) | (0.49) | (0.50) | (0.49) | | |
|--|--------|--------|--------|--------|--|--|
| | [430] | [346] | [410] | [339] | | |
| Note: standard deviation between parentheses and sample size between brackets. | | | | | | |
| Source: Farmer survey data merged with administrative cooperative data | | | | | | |

Table 59 - Training received by treatment group in 'additional cooler effect analysis'

4.4.2. Baseline balance

We checked the baseline balance for both treatment definitions.

The baseline balance for the 'UCCCU cooperative effect analysis' is shown in Table 60.

The standardized wealth index was computed using the consumer durables, housing characteristics, and public utilities. Household assets were categorized by three groups namely consumer durables (radio, TV Phone, Fridge, Car Bicycle and expensive utensils), housing characteristics (floor and wall materials as well as toilet facility) and public utilities comprising of access to electricity and water source. Consume durables and access to electricity were assessed using a binary outcome – whether or not a household or one of its members owned a durable. The rest of the assets were assessed using three outcomes namely high quality, medium quality and low quality (Smits & Steendijk, 2013; UBOS and Macro International 2000/1; 2006; 2011).

With regards to water supply, high quality sources comprised bottled water and water piped into dwelling or premises. Middle quality sources were public tap, protected well, and tanker truck; low quality sources were unprotected well, borehole, spring, and surface water. Pertaining to toilet facilities, high quality denoted any kind of private flush toilet while middle quality facilities were public toilet and improved pillatrine; low quality were traditional pit latrine, hanging toilet and no toilet facility. On the other hand high quality denotes cement, concrete, and raw wood; the low quality were earth, dung and none (Smits & Steendijk, 2013).

Computation of the asset weights was made using the Principal Component Analysis (PCA) approach (Filmer & Pritchett, 1999; 2001; Sahn & Stifel, 2003). Contrary to a summated score (McKenzie, 2005) the PCA approach does not weight each of the assets equally. In other words, the possession of consumer durables, housing characteristics and public utilities does not contribute equally to a household's wealth score. After the PCA analysis, the wealth index was standardized over de whole dataset, so including baseline and end line, so that the mean wealth index is zero and has a standard deviation of one. That way, the wealth index indicates relative wealth. Hence, the values of the wealth index in the table represent the distance from the mean in standard deviations.

The farmers living in an assigned treatment area are wealthier, more often literate and more ofter registered under a dairy cooperative. In the regressions in the next sections we control for these differences.

| | Bas | Baseline | | | |
|--------------|---------|---------------|--------------------------|--|--|
| | Control | Treatmen t | p-value | | |
| Wealth index | -0.69 | 0.32 | 0.000 ^{**} * | | |
| | (0.80) | (0.81) | | | |

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| | [370] | [470] | |
|---------------------------------------|---------|---------|--------------------------|
| Household head can read and write | 0.60 | 0.82 | 0.000** |
| | | | |
| | (0.49) | (0.38) | |
| | [370] | [470] | |
| Herd size | 60.21 | 60.70 | 0.896 |
| | (75.57) | (69.07) | |
| | [370] | [470] | |
| Registered under dairy cooperative | 0.64 | 0.76 | 0.000 ^{**} * |
| | (0.48) | (0.43) | |
| | [370] | [470] | |
| Total size of the rented out land (in | 1.40 | 1.23 | 0.732 |
| acres | (15.29) | (8.53) | |
| | [370] | [468] | |
| | | | |

Note: standard deviation between parentheses and sample size between brackets. Source: Farmer survey data Table 60 - Baseline balance for 'UCCCU cooperative effect analysis'

Table 61 presents the baseline balance for the treatment based on the acquisition of a cooler. We see similar differences.

| | Base | - | |
|-----------------------------------|------------------|------------------|--------------------------|
| | No aBi cooler | aBi cooler | p-value |
| Wealth index | -0.08 | 0.32 | 0.000 ^{**} * |
| | (0.90) | (0.82) | |
| | [430] | [410] | |
| Household head can read and write | 0.75 | 0.82 | 0.000 ^{**} * |
| | (0.43) | (0.38) | |
| | [430] | [410] | |
| Herd size | 62.03 (70.69) | 60.36 (69.28) | 0.501 |

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| | [430] | [410] | |
|---|----------------------|----------------|---------|
| Registered under dairy cooperative | 0.70 | 0.76 | 0.000** |
| | (0.46) | (0.43) | |
| | [430] | [410] | |
| Total size of the rented out land (in acres) | 1.13 (10.09) | 1.27 (8.96) | 0.673 |
| | [429] | [409] | |
| Note: standard deviation between parentheses ar | nd sample size betwe | en brackets | |

Source: Farmer survey data merged with administrative cooperative data.

Table 61 - Baseline balance for 'additional cooler effect analysis'

4.4.3. Methodology

2.

As mentioned in section 4.2.11.2, we test the following theory of change:

- 1. Farmers receive training on best farm practices and hygienic milk handling
 - Farmers apply the lessons from the training
- 3. They deliver good quality milk and increase farm productivity
- 4. Farmers sell to multiple markets at attractive conditions
- 5. Farmers sell more milk and at higher prices, also due to the new coolers at the cooperatives
- 6. They make larger profits
- 7. They increase their production capacity (herd size)
- 8. Their income increases and they employ more people

The first point is partly discussed in section 4.4.1.3.

The survey data includes much information related to this theory of change. We present descriptive results for many variables²⁰³, showing differences between baseline and endline and between treatmen and control, while we estimate the impact for a selection of these variables using regression analysis as described below. The variables that we selected for the impact analysis are the ones that we consider the most important factors. They are crucial in the confirmation or rejection of the theory of change.

We estimate the Intention-to-Treat (ITT), as both treatment indicators are defined at the cooperative level while not all farmers in the treatment groups received training or benefit from the coolers at the cooperatives. We estimate the ITT using a double differences analysis. The assessment was made using all records compiled at the baseline (n = 840) and end line (n = 700). Analysis using all the records was done because the attrition analysis shows that attrition was not systematic. The specification that we estimate is as follows for farmer i from cooperative c at time t:

 $y_{i,c,t} = \beta_0 + \beta_1 TIME_t + \beta_2 TREAT_c + \beta_3 TIME_t \times TREAT_c + \gamma_1 X_{i,c,t} + v_c + \varepsilon_{i,c,t}$

Where β_3 is the coefficient of interest. We control for wealth, household head literacy and dairy cooperative registration in covariate matrix X and for cooperative fixed effects in v_c.

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²⁰³ Variables that are not included in the report are presented in Appendix H.

The standard deviations are corrected for clustering at the cooperative level and sampling weights on the household level are used to ensure representativeness of the results.

As we measure the difference between the trends of the treatment and control group, the results are no influenced by the fact that the baseline survey took place in April and the end line survey in July.

4.4.4. UCCCU cooperative effect analysis results

We present the results for the 'UCCCU cooperative effect analysis' first, after which we discuss the results for the 'additional cooler effect analysis' in section 4.5. This section follows the theory of change as discussed in the previous section and provides both descriptive and regression results.

4.4.4.1. Farmers receive training on best farm practices and hygienic milk handling

While section 4.4.1.3 discussed the percentage of farmers that participated in dairy trainings, this section elaborates on the trainings received. Recall that 56 percent of treatment farmers received training between baseline and end line.

In order for farmers to have the possibility to benefit from the programme, they need to be members of the treatment cooperatives. Farmers were asked about their registration in any dairy cooperative and that of any other household members. Table 62 presents results on membership of household head and any other household member in a dairy cooperative at the baseline and the end-line stages of the evaluation.

In the results, majority of the households in the treatment and control groups had a registered member of a dairy cooperative society at both the baseline and end line. However, the proportion with a registered member of a dairy cooperative society was higher in the treatment when compared to the estimate in the control group. In the treatment group, the proportions with a registered member in a dairy cooperative at the baseline and end line were 76.1% and 84.5%, respectively. The equivalent proportions in the control area at the two stages of the evaluation were 64.1% and 55.2%, respectively. These results imply that the intervention might have motivated households to become members of the cooperatives. However, the participation in dairy trainings did not grow as much as the increase in cooperative membership, as that only increased from 52 to 56 percent (see Table 57).

The results also show that most farmers live between one and ten kilometres away from the milk collection centres of the cooperatives and almost all the farmers have ever delivered milk at milk collection centres.

| Indicators | Baseline (%) | | | Baseline (%) End-line (%) | | |
|--|---------------|-------------|------|---------------------------|-------------|-----|
| | Treatme nt | Contr ol | Diff | Treatme nt | Contro l | Di |
| % of households with a registered member of a dairy cooperative society | 76.1 | 64.1 | 12.0 | 84.5 | 55.2 | 29 |
| Distance of household from milk collection centre | | | | | | |
| 0 - 500 M | 8.5 | 7.3 | 1.2 | 9.7 | 5.4 | 4. |
| 501 -1001 M | 6.5 | 8.1 | -1.6 | 7.7 | 6.3 | 1. |
| 1.1 - 2 KM | 26.0 | 22.2 | 3.8 | 23.9 | 12.3 | 11. |
| 2.1 - 5 KM | 27.3 | 20.5 | 6.8 | 25.5 | 20.0 | 5. |
| 5.1 - 10 KM | 13.8 | 16.5 | -2.7 | 16.5 | 20.6 | -4 |
| More than 10 KM | 3.1 | 5.1 | -2.0 | 6.6 | 4.8 | 1. |

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| Indicators | Baseline (%) | | | En | d-line (%) | |
|-----------------|---------------|-------------|------|---------------|-------------|-----|
| | Treatme nt | Contr ol | Diff | Treatme nt | Contro l | Di |
| Do not know | 13.1 | 11.6 | 1.5 | 10.7 | 28.0 | -17 |
| Did not deliver | 1.7 | 8.6 | -7.0 | 0.0 | 2.7 | -2. |
| | | | | | | |

Table 62 - Distribution by membership in a dairy cooperative society

Table 63 shows the training participation specified by training topic. As earlier indicated, farm owners and workers in the treatment area were targeted for training in clean milk production and handling, mill hygiene as well as livestock feeding, pasture establishment and management. Overall, the findings show a relatively low level of receipt of training for the various dairy production techniques in the treatment and control group at the baseline and end line. Nevertheless, the predominant techniques the households confirmed receiving training were general dairy hygiene, followed by training in animal health management, animal nutrition, pasture production and milking skills. Like the findings in section 4.4.1.3 a higher proportion receiving training in the techniques was noted in the treatment area when compared to the estimates in the control group. For example, the proportions who received training about genera dairy hygiene in the treatment area at the baseline and end line were 43.8% and 41.8%, respectively. The equivalent proportions in the control area at the baseline and end line were 28.9% and 23.0% respectively.

| Items | Bas | Baseline (%) | | | End-line (%) | | |
|--------------------------|---------------|--------------|------|---------------|--------------|----|--|
| | Treatme nt | Contro l | Diff | Treatme nt | Contro l | Di | |
| Milking Skills | 32.1 | 25.4 | 6.7 | 34.6 | 17.3 | 17 | |
| General Dairy Hygiene | 43.8 | 28.9 | 14.9 | 41.8 | 23.0 | 18 | |
| Animal Health Management | 38.2 | 27.3 | 10.9 | 41.4 | 23.3 | 18 | |
| Animal Nutrition | 35.3 | 24.9 | 10.5 | 34.8 | 20.0 | 14 | |
| Use of Vaccines | 30.6 | 21.9 | 8.7 | 29.7 | 14.9 | 14 | |
| Pasture Production | 31.8 | 19.5 | 12.4 | 33.9 | 12.0 | 21 | |
| Animal Breeding | 29.2 | 23.5 | 5.7 | 35.7 | 18.5 | 17 | |

Table 63 - Distribution by receipt of training in the following dairy production techniques at baseline and end line in the past 12 months

4.4.4.2. Farmers apply the lessons from the training

The assumption that farmers adopt the techniques they learned during the training can be analysed using three different indicators: knowledge of dairy techniques, self-reported adoption of dairy techniques and self-reported use of dairy techniques. The latter asks directly about the production process that the farmer applies. The results of the regression analysis for knowledge and adoption of the dairy production techniques are presented in Appendix F. The self-reported use of dairy techniques is analysed in a descriptive manner.

Knowledge of Farm Production Techniques

Overall, both the treatment and control areas had a high coverage with regard to knowledge about dairy production techniques, namely milking skills, general dairy hygiene, animal health management and

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animal nutrition as over 74 percent of farmers knew about these techniques at baseline. A relatively smaller percentage of treatment farmers had knowledge at baseline of the use of vaccines, pasture production and animal breeding and the results show an increase for all those that group on all those indicators between baseline and end line. However, we only find a significant increase in the knowledge of vaccination skills of 14.2 percent (see Appendix F) and the data show that this result is partly driven by the decrease in knowledge of the control group.

Also interesting to point out is the fact that relatively more control farmers knew about these techniques at baseline, except for pasture production and animal breeding. Yet, between 2014 and 2016, the control farmers seem to have become more critical on their knowledge as the percentage decreases for all production techniques but animal breeding. Note that these results are weighted to correct for the attrition in the sample, which could have been selective.

Overall, the impact of the intervention on dairy production knowledge is limited.

| Items | Bas | Baseline (%) | | | Endline (%) | | |
|--------------------------|---------------|--------------|-------|---------------|-------------|------|--|
| | Treatme nt | Contro l | Diff | Treatme nt | Contro l | Dif | |
| Milking Skills | 88.6 | 97.3 | -8.7 | 84.6 | 85.4 | -0.7 | |
| General Dairy Hygiene | 87.5 | 94.6 | -7.1 | 87.6 | 85.7 | 1.9 | |
| Animal Health Management | 82.7 | 84.1 | -1.3 | 80.7 | 80.9 | -0.2 | |
| Animal Nutrition | 73.6 | 77.0 | -3.5 | 72.7 | 70.7 | 1.3 | |
| Use of Vaccines | 66.1 | 81.4 | -15.3 | 71.6 | 71.6 | -0.0 | |
| Pasture Production | 61.9 | 47.6 | 14.4 | 72.6 | 45.1 | 27.5 | |
| Animal Breeding | 58.7 | 57.6 | 1.2 | 71.9 | 71.9 | -0.0 | |

Table 64 - Distribution by Knowledge of the following farm production techniques at baseline and end line

Self-reported adoption of knowledge of production techniques

Despite the reported knowledge in the dairy production techniques, adoption of the techniques in strikingly lower as shown in Table 65. About half of the farmers that know about the techniques adopthem in practice.

The data in the table below show a similar pattern as the data in Table 64: general dairy hygiene, anima health management, milking skills and animal nutrition are the most widely used techniques. However, the proportion who adopted the training on the production techniques was however relatively higher among households at the baseline in both the treatment and control group. For example, the proportion who adopted the training in general health management in the treatment group at the baseline and end line were 50.3% and 34.7%, respectively. The equivalent proportions in the control are at the baseline and end using the regression analysis.

As earlier indicated, farm owners and workers in the treatment area were targeted for training in clear milk production and handling, milk hygiene as well as livestock feeding, pasture establishment and management. While the quantitative results do not show any positive effects, qualitative data suggests that the farmers appreciated that the training approach took on a "hands on" practical style. Farm owners and workers were trained on a farm belonging to one of the farmers. The approach adopted in the delivery

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of the training enhanced not only the acquisition of both knowledge and skills but also created at environment suitable for peer consultation and consequently ease of adoption. Further, the approach enables farmers to acquire farm inputs such as pasture planting material, seeds and/or vegetative material from the training farms much easily. Farmer exchange visits in the treatment area were also organized through the intervention. However, farmers in the control area had to incur costs in organising for such activities. The organization of exchange visits led to farmers valuing information acquired; and in addition peer challenge provoking them to adopt. It was observed that small herders found it easier to adopt compared to their counterparts with large herds. Likewise, commercially oriented dairy farmers adopted much faster than subsistence farmers. Nevertheless, the findings in Table 65 show a generally low level of adoption of the knowledge obtained from the training.

| Items | Bas | eline (%) | | End-line (%) | | | |
|--------------------------|---------------|-------------|------|---------------|-------------|----|--|
| | Treatme nt | Contro l | Diff | Treatme nt | Contro l | Di | |
| Milking Skills | 47.4 | 49.2 | -1.8 | 27.8 | 14.9 | 12 | |
| General Dairy Hygiene | 50.3 | 46.2 | 4.1 | 34.7 | 20.0 | 14 | |
| Animal Health Management | 49.1 | 46.8 | 2.4 | 34.3 | 20.6 | 13 | |
| Animal Nutrition | 39.0 | 37.6 | 1.5 | 28.8 | 17.6 | 11 | |
| Use of Vaccines | 35.3 | 38.4 | -3.1 | 24.3 | 12.8 | 11 | |
| Pasture Production | 24.6 | 13.8 | 10.8 | 24.7 | 9.9 | 14 | |
| Animal Breeding | 27.5 | 31.4 | -3.8 | 27.9 | 16.1 | 11 | |

Table 65 - Distribution of self-reported adoption of the following dairy production techniques at baseline and end line

Use of dairy production techniques

We also asked questions that are more specific about the use of dairy production techniques, such as the main grazing system, the milking place, storage and transportation equipment and milking material Descriptive results are shown below.

Results in Table 66 show a similar pattern in the dairy production systems used in the treatment and control area at the baseline and end line. The most predominant production system utilized is fenced farm without paddocks. The proportion using the system of dairy proportion in the treatment area at the baseline and end line was 55.5% and 34.9%, respectively. The equivalent proportions in the control area were 83.4% and 66.4%, respectively. The evidence shows that this production system was predominant in the control area when compared to the treatment area. The second most commonly practiced system or production is fenced farm with paddocks. The system was predominantly adopted among farmers in the treatment when compared to the utilization among the counterparts in the control area. Use of fencee paddock systems became a coping mechanism during the dry season. This was coupled with reducing cattle herd sizes to suit the farm carrying capacity. Paddocks also were seen to facilitate tick controt through rotational grazing. This was of utmost importance to the dairy farmers in the control area area in the control area of their utilization.

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| Production systems | Bas | Baseline (%) | | | End-line (%) | | |
|--|---------------|--------------|-------|---------------|--------------|-------|--|
| | Treatme nt | Contr ol | Diff | Treatme nt | Contr ol | Diff | |
| Main system of dairy production Zero grazing | 28 | 4.1 | -0.2 | 0.1 | 19.1 | -9.1 | |
| Tethering | 1.5 | 4.1 1.9 | -0.4 | 9.1 5.2 | 7.1 | -3.1 | |
| Communal grazing | 4.0 | 3.3 | 0.8 | 7.9 | 6.5 | 1.3 | |
| Fenced [Paddocks] | 35.1 | 7.3 | 27.8 | 43.0 | 7.8 | 35.2 | |
| Fenced [No paddocks] | 55.5 | 83.4 | -27.9 | 34.9 | 66.4 | -31.5 | |

Table 66 - Distribution of dairy production systems at baseline and end line

Table 67 presents a distribution by milk harvesting and handling practices in the treatment and control area. The results show the predominant milking place at the baseline and end line as Kraal. The proportions utilizing the venue for milking were comparable in the treatment and control area at the baseline and end line. Milking from the kraal is a common occurrence in the treatment and control areas due to high expenses incurred in construction of milking parlours or shed. In addition, farmers often milk several animals at a time; thus, constructing a milk parlour with several compartments could be yield higher construction costs which are usually not readily available. Qualitative data from FDGs in the treatment and control area revealed that the costs involved in the construction of the milk parlours are usually a hindrance towards the achievement.

In addition to the kraal, about 10-20% mentioned that they had no particular place for milking their cows at the baseline and end line. The proportion with no identified place reduced slightly more in the treatment area compared to the control area. Although milk sheds are highly recommended, low proportions of farmers utilizing the practice is noted in the treatment and control areas at the baseline and end line. Undertaking the activity under a shed protects milk from environmental contamination which accelerates the rate of milk deterioration.

With regard to the storage of milk on the farm, milk cans were identified as the predominant equipment utilized for the purpose. However, the proportion utilizing the equipment for storage of milk was about three times higher in the treatment area when compared to the figure in the control area at both the baseline and end line. In particular, the proportions utilizing milk cans in the treatment area at the baseline and end line were 84.6% and 85.5%, respectively. The corresponding proportions in the control area were 28.9% and 38.7%, respectively. On the other hand, the proportion utilizing plastic jerry cans in the treatment area at the baseline and end line were 8.3% and 5.6%, respectively. The equivalent proportions in the control group were 52.2% and 30.3%, respectively.

The predominant transportation equipment for households in the treatment area was milk cans However, the control area utilized mainly plastic jerry cans for the purpose. In particular, the proportion using Milk cans at the baseline and end-line was about two times higher in the treatment group when compared to the estimates in the control group.

Nevertheless, the increase in the proportion utilizing milk cans in the treatment area at the baseline (88.1%) and end-line (91.2%) shows that the provision of milk cans at subsidized prices was successful in promoting the appropriate transportation equipment. The findings further show a relatively small proportion using plastic jerry cans for transportation of milk in the treatment area at the baseline (8.4%) and End line (6.7%). The equivalent proportions in the control group at the baseline and End line were 58.6% and 50.3%, respectively. This evidence shows a higher proportion of households utilizing

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inappropriate equipment for milk transportation in the control area when compared to the figures in the treatment group.

It is evident from the results that more farmers utilize milk cans to store and transport milk in the treatment group (>80%) than in the control area (>28%). Milk cans are much easier to clean than the Jerry cans and they accelerate cooling of milk during transit than the jerry cans. Milk cans therefore do not facilitate growth of bacteria. However, milk cans are more expensive and less user friendly than the plastic jerry cans when transporting milk especially using a motorcycle or bicycle – the predominant transportation facility in the treatment and control areas. Nevertheless, qualitative data revels that co-operative societies in the treatment and control areas have established policies against use of plastic jerry cans to be rejected by MCC in the treatment group than in the control group. Therefore, it is more likely for milk transported in plastic Jerry cans is highly likely to fail organoleptic platform tests on arrival at the milk-collecting centre; thus, rejected.

Thus, farmers in the treatment and control area were urged to purchase milk cans through the dairy cooperative society at subsidized prices. It is likely that acquisition of the milk cans was easier in the treatment group than in the control area due to the subsidization through the intervention.

| Handling | Bas | seline (%) |) | End-line (%) | | |
|----------------------|---------|------------|-------|--------------|-------|-------|
| Practices | Treatme | Contr | Diff | Treatme | Contr | Diff |
| | nt | ol | | nt | ol | |
| Milking place | | | | | | |
| Milk shed | 12.3 | 3.8 | 8.6 | 9.3 | 4.4 | 4.9 |
| Kraal | 64.7 | 67.8 | -3.2 | 77.1 | 71.5 | 5.5 |
| Compound | 2.3 | 1.1 | 1.2 | 3.1 | 3.1 | -0.0 |
| No specific place | 20.7 | 26.8 | -6.1 | 10.4 | 20.3 | -10.0 |
| Other | -0.0 | 0.5 | -0.5 | 0.2 | 0.6 | -0.4 |
| Storage Equipment | | | | | | |
| Plastic Jerry Cans | 8.3 | 52.2 | -43.9 | 5.6 | 30.3 | -24.7 |
| Milk Cans | 84.6 | 28.9 | 55.7 | 85.5 | 38.7 | 46.9 |
| Metallic Bucket | 2.5 | 2.7 | -0.2 | 3.6 | 9.1 | -5.4 |
| Plastic Bucket | 3.1 | 8.6 | -5.6 | 3.2 | 7.3 | -4.2 |
| Other | 1.6 | 7.6 | -6.0 | 2.0 | 14.6 | -12.6 |
| Transportation Equ | ipment | | | | | |
| Plastic Jerry Cans | 8.4 | 58.6 | -50.3 | 6.7 | 50.3 | -43.6 |
| Milk Cans | 88.1 | 35.9 | 52.2 | 91.2 | 46.8 | 44.4 |
| Metallic Bucket | 2.6 | 0.5 | 2.1 | 1.6 | 1.0 | 0.6 |
| Plastic Bucket | 0.5 | 1.4 | -0.9 | 0.5 | 0.3 | 0.2 |
| Other | 0.4 | 3.5 | -3.2 | -0.0 | 1.6 | -1.6 |
| | | | | | | |

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Table 67 - Milk harvesting and handling practices at baseline and end line

The materials used during milking will influence the quality of milk harvested. In other words, proper use of milking materials should ensure minimal contamination of milk as it flows from the udder into a milking vessel and finally into a storage and/or transportation vessel. Further, the utilization of appropriate materials will enable farmers employ proper milking practices which include the following tying of the cow's tail, washing of the milkers' hands; washing and drying the teats, screening for clinica mastitis; disinfecting milking utensils and cooling milk. Figure 35 and Figure 36 present a distribution by materials used when milking cows; multiple responses were allowed.

Similar to the baseline, the predominantly used materials when milking cow at the end line stages were milking buckets, teat dips and ropes. The proportions using metallic buckets when milking in the treatment area at the baseline and end stages were 71.7% and 80.6%, respectively. The equivalent figures in the control group were 35.8% and 56.6%, respectively. These findings demonstrate a higher proportior using metallic buckets when milking in the treatment group when compared to the control area. In fact the proportion using metallic buckets in the treatment group when milking at the end line was about one and half times higher the figure in the control group. In addition to metallic buckets, disinfectants are vital in achieving high quality milk; however, they were among the least used item during milking in both groups at the baseline and end line. On the other hand, the proportion using plastic buckets in the treatment group when compared to the control. However using plastic buckets when milking in the treatment group when compared to the control. However because more control farmers switched from plastic to metallic buckets compared to the reatment farmers this cannot be attributed to the intervention.

Disinfectants enable farmers to ensure hygienic milking by killing bacteria in water that will be used to clean the teats and milking utensils. This is necessary since water used on most of the farms in the study groups is obtained from open water systems, which are often contaminated. Another important basic cleaning agent was soap used by only 6.9% and 0.7% of the households in the treatment and control groups at the end line, respectively. The proportions using soap at the baseline were 4.8% and 0.3% respectively. This evidence points to low utilization of cleaning agents particularly in the control area which shortfall leads to further deterioration of milk quality. Likewise, very few households regularly screened their cows for clinical mastitis using a strip cup before milking in the treatment and control groups. The proportion using the equipment in the treatment area at the baseline and end line were 3.3% and 0.5% respectively. The equivalent proportions in the control area were 3.4% and 11.5%, respectively. This implies that there was a higher likelihood of mixing milk from infected udders with that from clear animals in both the treatment and control area.

Milking towels are often used to clean the udder prior to milking. This is done to reduce dirt present or the udders that could easily gain access into the milk during the milking process. These were however used by only 3.1% and 2.7% of the households in the treatment groups, respectively. The equivalen proportions in the control area were 9.5% and 1.4%, respectively. The rest of the essential materials were used by less than 30% of the households in both study groups at the baseline and end line. Failure to use these materials when milking increases the odds of milk contamination; which subsequently leads to rejection at the MCC. The shortfall in utilization of the materials may be due to traditional practice o letting lactating cows feed their calves to induce the milk let-down process. Subsequently, it is believed that the udder is made clean; hence no need to wash the udder. Further, the low utilization of the cleaning materials could also be an issue of limited access to water in the study area.

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Because of the limited training implementation and uptake in addition to the lack of positive results at the cooperative level, we do not expect to find an impact further in the result chain in the 'UCCCU cooperative effect analysis'.

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4.4.4.3. Delivering good quality milk and increasing farm productivity

We do not have any indicators for milk quality. A proxy for that would be the amount of milk rejected However, only 1 percent of farmers at baseline and 0.07 percent of farmers at end line say that part of their milk rejected or had drug residue and it is not clear how much milk this was.

Farm production is measured by the milk production in the last 7 days and milk production per cow Figure 37 illustrates the latter. While cows in the control area produced 4 litres per day on average a baseline, cows in the treatment produced about 6.5 litres per day. In both areas, the cows produced more milk per day at end line. This could be due to the different time period in which the survey was administered (baseline in April, end line in July). In general, the cows in the treatment area were more productive. In order to find a significant impact using a differences-in-differences analysis, the increase in milk production should be significantly larger in the treatment area compared to the control area. The figure shows no clear difference in the milk production increase, so we do not expect to find a significant impact.



Figure 37 - Milk production per cow per day by treatment status and survey

The analysis of farm productivity is shown in Table 68. The outcome indicators used are average mill production (past seven days, column 1), average milk production per cow per day (column 2) and "utilized milk" (column 3). Utilized milk is the amount of milk that is consumed or sold. The difference between milk production and milk utilized exists because the milk was poured, went sour, was rejected or had drug residue. In compliance with the figure above, we find no significant treatment effect on farm productivity (see the estimates of beta 3 in row one of the table).

| Ex ante | (1) | (2) | (2) |
|---------|-------------------------|-------------------------|------------------|
| | Average milk production | Average milk production | Utilized milk in |
| | in past 7 days | per cow per day | past 7 days |
| DD | -414.346 | 1.093 | 2.996 |
| | (409.443) | (1.507) | (52.768) |

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| Treat | -526.218 | -6.448 | -92.909 |
|--------------|-------------|----------------------|-----------|
| | (439.346) | (4.061) | (121.426) |
| Follow-up | -82.620 | 0.354 | -46.926 |
| | (385.825) | (1.166) | (35.894) |
| Constant | 1326.170*** | 5.050 ^{***} | 55.223 |
| | (254.196) | (0.765) | (117.913) |
| Controls | Yes | Yes | Yes |
| Observations | 1440 | 1440 | 1519 |
| r2 | 0.219 | 0.085 | 0.156 |
| ymean | 1138.671 | 7.248 | 332.089 |

Table 68 - Farm productivity by UCCCU treatment status

Standard errors in parentheses

Controlled for wealth, literacy of the household head, dairy cooperative membership and cooperative dummies. * *p* < .10, ** *p* < .05, *** *p* < .01

Source: Farmer survey data

4.4.4.4. Sales to multiple markets at attractive conditions

Dairy farmers in Uganda usually target to market their milk in urban areas because there is hardly any market in the rural areas. This creates room for middle men in the supply chain. The fewer the middle men the higher the price at which milk is sold by the farmer. The main avenues for milk marketing include direct consumers, vendors/traders; milk co-operatives and milk processors. Table 69 presents results on milk utilization markets in the past seven days prior to the survey.

Overall, the baseline and end line evaluation reveals a similar pattern with regard to the utilization of mill in the control and treatment area. Almost all farmers use part of their milk for family consumption. The biggest markets for milk in both study areas were the dairy co-operatives, with 83.1 and 88.3 percent o treatment farmers selling to cooperatives in the 7 days before the baseline and end line respectively and 79.6 and 74.8 percent of the control farmers. The average quantities of milk sold to cooperatives by those farmers in the treatment area at baseline and end line were 316.8 and 280, respectively. The equivalen figures in the control area were 222.5 and 280.1, respectively. Evidently there is more milk sold to the cooperatives in the treatment area when compared to the estimates in the control group. About 16 percen of treatment farmers also sold 273 litres of milk on average to vendors, even though vendors are no preferred because they often pay farmers after they have sold milk. Sometimes farmers are not paid on the pretext that milk went bad or sour.

With regard to unutilized milk, the proportions responding in the affirmative in the treatment area at the baseline and end line were 5.7% and 4.1%, respectively. The equivalent proportions in the control area were 6.2% and 5.4%, respectively. For both groups, the proportion of farmers with unutilized milk and the amount of unutilized milk decreased between baseline and end line. Although the amount of mill unutilized was twice are large for control farmers compared to treatment farmers, this amount decreased between baseline and end line to such an extent that the amount of unutilized milk was lower than that o the treatment farmers.

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| Utilization and Price | Baseline (Mean) | | | End-line (Mean) | | |
|-------------------------|-----------------|-------------|-------|-----------------|-------------|-------|
| | Treatme nt | Contr ol | Diff | Treatme nt | Contr ol | Diff |
| Utilized Milk | | | | | | |
| [Percentage of farmers] | | | | _ | | |
| Family | 96 | 99.4 | -3.4 | 97.8 | 99.4 | -1.6 |
| Calves | 10 | 3.4 | 6.6 | 13.5 | 1.6 | 11.9 |
| Cooperative | 83.1 | 79.6 | 3.5 | 88.3 | 74.8 | 13.5 |
| Vendor | 15.2 | 7 | 8.2 | 16 | 14.4 | 1.6 |
| Donated | 14.7 | 4.2 | 10.5 | 8.8 | 12.3 | -3.5 |
| Direct consumer | 12.6 | 3.9 | 8.7 | 6 | 1.9 | 4.1 |
| Milk processors | 20.9 | 10.3 | 10.6 | 5.6 | 8.5 | -2.9 |
| Other | 2.6 | 0 | 2.6 | 0.6 | 1.3 | -0.7 |
| Utilized Milk [Litres] | | | | | | |
| Family | 38.1 | 52.7 | -14.6 | 39.9 | 46.3 | -6.4 |
| Calves | 77.3 | 100.0 | -22.7 | 81.2 | 28.2 | 52.9 |
| Cooperative | 316.8 | 222.5 | 94.3 | 280.1 | 159.9 | 120.2 |
| Vendor | 272.3 | 224.9 | 47.4 | 273.9 | 274.2 | -0.4 |
| Donated | 41.7 | 22.8 | 18.9 | 65.0 | 12.2 | 52.8 |
| Direct consumer | 47.6 | 27.4 | 20.2 | 27.7 | 38.2 | -10.4 |
| Milk processors | 14.3 | 40.2 | -25.9 | 28.5 | 24.9 | 3.6 |
| Other | 125.7 | 125.7 | 0.0 | 23.2 | 11.3 | 11.9 |
| Unutilized Milk | | | | | | |
| % with unutilized milk | 5.7 | 6.2 | -0.5 | 4.1 | 5.4 | -1.3 |
| Unutilized milk[litres] | 54.1 | 108.9 | -54.8 | 31.5 | 22.2 | 9.3 |

Table 69 - Milk utilization and markets in the study areas at baseline and end line

Note. Estimates are based on milk sold in last seven days prior to the survey

Turning to the regression results on sales to different markets, as measured by the share of utilized mill for own consumption or sold to various clients, we see a limited shift in sales to different markets. There is a decrease in share of milk that is sold to traders, and an insignificant increase in the share sold to cooperatives.

Earlier, in section 3.4.2, we mentioned that farmers might prefer other clients to the cooperatives due to the loan repayment deduction from the price. The results in Table 70 show that this is not the case, as we do not find a decrease in the share of milk sold to cooperatives.

In addition, we analysed the share of milk that was unutilized, but we do not find an effect from the intervention.

The conditions are discussed in the next section in terms of prices.

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| Ex ante | (1) | (2) | (3) | (4) | (5) | (6) |
|---------------------|-------------------|---------------|--------------|-----------|------------|------------|
| | Share of | Share of | Share of | Share of | Share of | Share of |
| | utilized milk for | utilizeď | utilized | utilized | utilizeď | milk |
| | own | milk sold | milk sold | milk sold | milk sold | unutilized |
| | consumption | to | to traders | to direct | to | |
| | - | cooperativ | | consume | processors | |
| | | es | | rs | - | |
| DD | 0.039 | 0.027 | -0.053^{*} | -0.011 | -0.005 | -0.020 |
| | (0.035) | (0.062) | (0.030) | (0.008) | (0.003) | (0.018) |
| | | | | | | |
| Treat | -0.064 | 0.056 | -0.054 | 0.013 | 0.014 | 0.043 |
| | (0.073) | (0.187) | (0.202) | (0.010) | (0.011) | (0.037) |
| | | | | | | |
| Follow- | 0.012 | -0.029 | 0.030^{*} | -0.009** | -0.003*** | -0.003 |
| up | | | | | | |
| | (0.033) | (0.057) | (0.016) | (0.004) | (0.001) | (0.006) |
| | *** | • *** | ~ *** | | *** | |
| Constant | 0.339*** | 0.484*** | 0.128*** | 0.004 | 0.010*** | 0.005 |
| | (0.017) | (0.037) | (0.027) | (0.008) | (0.003) | (0.026) |
| O | V | ¥7 | ¥7 | ¥7 | ¥7 | ¥7 |
| Controls | res | res | res | res | res | res |
| Observati | 1451 | 1451 | 1451 | 1451 | 1451 | 1451 |
| ons | 0.400 | o 40 - | | 0.0((| o 10 1 | |
| r2 | 0.199 | 0.187 | 0.154 | 0.066 | 0.184 | 0.051 |
| ymean | 0.189 | 0.637 | 0.091 | 0.024 | 0.012 | 0.021 |
| Table 70 - U | se of milk by UCC | UU treatmen | t status | | | |

Standard errors in parentheses

Controlled for wealth, literacy of the household head, dairy cooperative membership and cooperative dummies.

* *p* < .10, ** *p* < .05, *** *p* < .01

Source: Farmer survey data

4.4.4.5. Selling more milk and at higher prices

The theory of change states that farmers could sell more milk to the cooperatives in the afternoon, as the cooperatives can save the milk for the next day in their coolers.

The predominant time of selling to the various market segments in the treatment and control areas was in the morning. In the results according to Table 71, the proportions selling milk in the morning in the treatment area at the baseline and end line were 82.1% and 73.4%, respectively. The equivalent proportions in the control area were 95.3% and 86.7%, respectively. The evidence shows a relatively smaller proportion of milk sold in the morning in the treatment area when compared to the control group A similar pattern of selling milk in the treatment and control area is noted by the rest of the segments namely vendors and consumers. These findings are in compliance with the findings at the cooperative level in section 3.4.2, where we found that cooperatives did not receive more milk in the afternoon.

Most of the milk collected by the MCC is milk harvested in the morning. Qualitative data showed that very few farmers have animals that can produce large quantities of milk both morning and afternoon. Further the participants from the interviews indicated that the small afternoon milk quantities are often left for domestic consumption, or left to the households for processing into yoghurt and/ or ghee. Further farmers usually use hired labour to milk their cows. Often these milking persons do not want to milk in

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the afternoon and tend to be quite costly when they do. So, farmers will prefer to have that milk made available for the replacement calves since these have to be healthy enough to yield much milk when mature.

| Market segment | Bas | Baseline (%) | | | d-line (%) | 1 |
|------------------|---------------|--------------|-------|---------------|-------------|-------|
| | Treatme nt | Contr ol | Diff | Treatme nt | Contr ol | Diff |
| Cooperatives | | | | | | |
| Morning | 82.1 | 95.3 | -13.2 | 73.4 | 86.7 | -13.4 |
| Afternoon | 2.8 | 2.9 | -0.1 | 4.1 | 4.3 | 0.2 |
| Both | 15.1 | 1.8 | 13.3 | 22.6 | 9.0 | 13.6 |
| Vendors | | | | | | |
| Morning | 77.7 | 95.7 | -17.9 | 63.7 | 88.3 | -24.6 |
| Afternoon | 4.8 | 4.3 | 0.5 | 13.5 | 4.7 | 8.8 |
| Both | 17.5 | -0.0 | 17.5 | 22.8 | 7.0 | 15.8 |
| Direct consumers | | | | | | |
| Morning | 75.9 | 100.0 | -24.1 | 59.6 | 75.0 | -15.4 |
| Afternoon | 8.8 | -0.0 | 8.8 | 35.7 | 25.0 | 10.7 |
| Both | 15.3 | -0.0 | 15.3 | 4.7 | 0.0 | 4.7 |

Table 71 - Time of selling the milk in the study areas at baseline and end line

Note. Estimates are based on milk sold in last seven days prior to the survey

Figure 38 illustrates the amount of litres of milk sold in the past 7 days. We saw before that the cows in the treatment area were more productive. This figure shows that the treatment farmers also sold more milk on average compared to control farmers. For both groups, the amount of milk sold was lower in the 7 days before the end line than before the baseline. In a differences-in-differences analysis, we would find a positive impact if the amount of milk sold decreased significantly less for treatment farmers than for control farmers. This does not seem to be the case.

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Figure 38 - Litres of milk sold in past 7 days by treatment status and survey

Likewise, the results for in the table below show no significant impact on the volume of milk sold in the y days before the survey.

| | (1) |
|------------|----------------|
| | Litres of milk |
| | sold |
| DD | -10.918 |
| | (47.492) |
| Treat | -73.753 |
| | (106.794) |
| | |
| Follow-up | -37.302 |
| | (31.197) |
| Constant | 2.216 |
| | (101.358) |
| Controls | Ves |
| Observatio | 1510 |
| ns | 1019 |
| r2 | 0.147 |
| ymean | 281.772 |

Table 72 - Volume of milk sold in past 7 days

Standard errors in parentheses Controlled for wealth, literacy of the household head, dairy cooperative membership and cooperative

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dummies. * p < .10, ** p < .05, *** p < .01. Source: Farmer survey data

For prices of milk sold in the past 7 days, Figure 39 shows the mean price and the price paid by cooperatives separated by treatment status and survey. The mean price calculated by multiplying the price per litre of milk sold to cooperatives, vendors, direct consumers and milk processors in the past 7 days with the number of litres sold to those clients and dividing this number by to the total number of litres sold by the farmer in the past 7 days. The figure shows that the price that cooperatives paid is lower than the mean price in the treatment area. Compared to baseline prices, cooperative prices are lower at end line for the control group, while cooperative prices are slightly higher at end line for the treatment group. The control farmers received a mean price of 6600 UGX at baseline compared to 500 UGX at end line, and these numbers are 780 UGX and 790 UGX respectively for the treatment farmers.



Figure 39 - Price of milk sold in past 7 days by treatment status and survey

Table 74 shows that there is only a positive effect on the price of milk sold to direct consumers. This means that the milk price paid by consumers dropped less for the treatment farmers, as Table 73 illustrates. Note that the number in Table 73 slightly differ from the numbers in the figure above. This is due to the sampling weights that are used in the table but not in the figure.

Nevertheless, we see a positive but insignificant effect on the mean price paid by cooperatives. Note that the price of milk sold to milk processors is excluded due to limited observations, but it is included in the calculation of the mean price. Recall from Table 69 that farmers only sell a small part of their milk to the processors.

| Market segment | В | aseline | | E | nd-line | |
|----------------|---------------|-------------|------|---------------|-------------|------|
| | Treatme nt | Contr ol | Diff | Treatme nt | Contr ol | Diff |

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| Milk price per litre (UGX) | | | | | | |
|-------------------------------|--------|--------|-------|-------|-------|--------|
| Cooperative | 753.2 | 593.0 | 160.2 | 787.6 | 501.3 | 286.3 |
| Vendor | 648.8 | 578.3 | 70.5 | 662.7 | 505.1 | 157.5 |
| Consumer | 966.8 | 936.4 | 30.4 | 676.3 | 525.0 | 151.3 |
| Milk processor | 1139.2 | 1139.2 | 0.0 | 600.0 | 750.0 | -150.0 |

Table 73 - Milk price per litre at baseline and end line

| | (1) | (2) | (3) | (4) |
|-----------|----------------|------------|----------------------|------------|
| | Mean | Average | Average | Average |
| | price per | price of | price of | price of |
| | liter of | milk sold | milk sold | milk sold |
| | milk sold | to | to | to direct |
| | | cooperativ | private | consume |
| | | es | vendors | r |
| DD | -54.508 | 127.468 | 4.386 | 404.296** |
| | (384.969) | (294.060) | (57.458) | (150.141) |
| Treat | -522.529 | -401.680 | 281.683* ** | 187.540 |
| | (1038.17 8) | (583.221) | (58.206) | (218.281) |
| Follow-up | -305.074 | -148.350* | -50.213 | - |
| | | | | 495.793*** |
| | (278.637) | (77.266) | (36.109) | (75.640) |
| Constant | 1552.471 | 696.985*** | 616.401 [*] | 916.234*** |
| | (1569.55 7) | (228.151) | (64.523) | (254.821) |
| Controls | Yes | Yes | Yes | Yes |
| Observati | 1366 | 1115 | 172 | 76 |
| ons | | | | |
| r2 | 0.103 | 0.020 | 0.427 | 0.357 |
| ymean | 981.057 | 756.465 | 645.153 | 876.933 |

Table 74 - Price of milk sold by UCCCU treatment status

Standard errors in parentheses Controlled for wealth, literacy of the household head, dairy cooperative membership and cooperative dummies. * p < .10, ** p < .05, *** p < .01Source: Farmer survey data

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4.4.4.6. Larger profits

The farmers were asked about their expenditures in de past 12 months on acaricide, artificia insemination, vet professional services, deworming, bulls, cows, calves, heifers, extension services, labour permanently hired, labour casually hired, feed supplements, fencing materials, fodder, land rent, training and other. In addition, the dairy income was calculated by multiplying the volume of milk sold to cooperatives, vendors, direct consumers, processors, and others and the volume of self-processed mill sold in the past 7 days with the corresponding prices, and adding those number up.

Figure 40 illustrates the differences in dairy income between the treatment and the control group and between baseline and end line. Dairy income is about twice as large for the treatment farmers compared to the control farmers at both points in time. This corresponds with the larger milk sales of the treatment farmers. However, the dairy income was lower at end line compared to baseline for both groups.



Figure 40 - Dairy income in past 7 days by treatment status and survey

In order to make the dairy expenses comparable to the dairy income, weekly dairy expenses were calculated by dividing the expenses in the past year by 52. By subtracting the dairy expenses from the dairy income, the dairy gross profit was calculated in the past 7 days. In compliance with the result above, the intervention did not have an impact on gross profits of the farmers, as shown in Table 75.

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| | (1) | (2) | (3) |
|--------------|-----------------|-------------------------------|-----------------------|
| | Dairy income in | Average dairy expenditures in | Dairy gross profit in |
| | past 7 days | past 7 days | past 7 days |
| DD | -17.195 | 19.139 | -36.334 |
| | (46.174) | (26.448) | (53.896) |
| Treat | -21.837 | -3.762 | -18.076 |
| | (82.173) | (32.300) | (68.671) |
| Follow-up | -34.174** | 10.077 | -44.251*** |
| | (13.905) | (7.347) | (10.099) |
| Constant | -57.436 | 91.597*** | -149.032** |
| | (64.918) | (30.170) | (59.495) |
| Controls | Yes | Yes | Yes |
| Observations | 1519 | 1519 | 1519 |
| r2 | 0.049 | 0.173 | 0.033 |
| ymean | 187.625 | 141.076 | 46.549 |

Table 75 - Dairy profit by UCCCU treatment status

Standard errors in parentheses

In 1000,000 UGX. Controlled for wealth, literacy of the household head, dairy cooperative membership and cooperative dummies. * p < .05, *** p < .01Source: Farmer survey data

4.4.4.7. Increase in production capacity (herd size)

Studying the herd structure reveals the management and planning approach of a farmer. Of utmos importance is the number of replacement heifers, which influences the profitability of the farm. A dairy farmer ought to have sufficient a number of heifers as replacement stock; at least 50% of the calves borr on-farm each year should be female. In so doing, a farmer is able to ensure continuous productivity of the farm. The survey compiled data regarding the size and structure of the herds in each of the households Table 76 provides mean herd sizes in the treatment and control areas structured by sex and age of the animal.

| Structure | Base | line (Mea | n) | End-line (Mean) | | |
|-----------------|---------------|--------------|---------------|-----------------|--------------|----------------|
| | Treatme nt | Contr ol | Diff | Treatme nt | Contr ol | Diff |
| Bulls | 2.1 | 2.1 | 0.07 | 2.1 | 2.1 | -0.08 |
| Heifers | 17.7 | 18.1 | -0.48 | 14.9 | 16.4 | 1.43 |
| Calves Cows | 16.2 30.0 | 13.2 30.6 | 2.96 -0.55 | 13.5 28.8 | 14.0 30.5 | -0.52 -1.74 |
| Castrated bulls | 8.6 | 10.8 | -2.27 | 6.5 | 16.2 | -9.70 |
| Total | 60.7 | 60.2 | 0.49 | 56.6 | 61.0 | -4.41 |

Table 76 - Distribution by herd size and structure at baseline and end line

The results show a generally similar pattern in herd structure between the treatment and control areas a the baseline and end line. Cows constitute the biggest number in both groups; the mean number of cows in the treatment area at the baseline and end line were 30 and 29 animals, respectively. The

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corresponding numbers in the control group were about 31 both at baseline and end line. The second most common animals were the heifers and calves.

The ratio of bulls to cows was about 1:15 in both the treatment and control areas. This is appropriate since the recommended bull-to-cow ratio is 1:25/30. This sex ratio ensures efficient utilization of resources on a dairy farm since bulls do not contribute directly to milk production. This is further emphasized by the total absence of bulls from some herds. The bull-to-cow ratio should not be surprising in light of the existence of bull hire services for breeding purpose (Nabasirye, Kugonza & Mpairwe, 2012).

Worth noting is the higher number of castrated bulls in the control area when compared to the figure in the treatment area. The mean numbers of castrated bulls in the control area at the baseline and end line were about 11 and 16, respectively. The mean numbers in the treatment group were about 9 and 7 respectively. Castrated bulls are often fattened and sold off for veal production serving as a source of income. The lower number of castrated bulls in both study areas demonstrated that these farmers do not depend on castrated bulls as a major source of income. Nevertheless, a higher proportion of households with castrated bulls in the control area show dependence on the animals as a source of income in the region when compared to the situation in the treatment area.

Table 77 presents the regression results on herd size. The theory of change says that when the farmers have larger dairy profits, they can invest in their cows. We did not find an impact on dairy profit Likewise, the intervention did not increase the production capacity. In fact, the number of calves and castrated bulls decreased by 4.6 and 1.9 animals respectively. During farm production training sessions and exchange farm visits, farmers were able to appreciate the benefits of sticking to the land carrying capacity. Increase in milk production was seen to be inversely proportional to herd size. To this end, bulk (including castrated ones) were categorized among the less economically beneficial animals particularly in the treatment area; thus, these were consequently culled. However, a notable increase in castrated bulls was realized in the control area. Qualitative data from the control area revealed that the castrated bulls are reared as a source of income for farmers.

....here we have farmers for dairy milk production and those for meat production as a form of business; thus, castrated bulls are reared as form of business. The castrated bulls are more economically beneficial compared to the dairy farming especially when you have a large piece of land (FGD with Kiboga Cooperative Society, Kiboga)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|-----------|----------|-------------|---------|------------------|------------------|---------------|
| Ex ante | HERDSI | BULL | HEIFER | CALV | COW | CASTRATED |
| treatment | ZE | S | S | ES | \boldsymbol{S} | BULLS |
| DD | -11.533 | -0.165 | -2.527 | - 4.604* * | -2.314 | -1.923** |
| | (7.535) | (0.172) | (2.269) | (1.894) | (3.32 8) | (0.729) |
| Treat | -19.916 | -0.051 | -5.931 | -2.907 | - 12.03 7 | 1.010 |
| | (19.884) | (0.343) | (5.295) | (6.459) | (8.42 4) | (0.787) |
| Follow-up | -1.044 | 0.044 | -1.918 | 0.699 | -1.441 | 1.572^{***} |
| | (0.418) | (0.038 | (1.91/) | (1.707) | (2.35 6) | (0.505) |

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| Constant | F9 4F0** | 0.208 | 14 880** | 8 002 | 20.10 | -0.824 |
|--------------|----------|-------------|----------|-------------|-------------------|---------|
| Constant | 53.450 | 0.200 | * | 0.992 | 30.19 0*** | -0.034 |
| | (21.599) | (0.369) | (5.427) | (6.827) | 3 (10.13 5) | (1.184) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1519 | 1519 | 1519 | 1519 | 1519 | 1519 |
| r2 | 0.258 | 0.099 | 0.204 | 0.276 | 0.225 | 0.074 |
| ymean | 58.415 | 1.609 | 13.787 | 13.569 | 27.56 8 | 1.883 |

Table 77 - Herd size by UCCCU treatment status

Standard errors in parentheses Controlled for wealth, literacy of the household head, dairy cooperative membership and cooperative dummies. * p < .10, ** p < .05, *** p < .01. Source: Farmer survey data

4.4.4.8. Increase in income and employees

Investing larger profits in the production capacity is assumed to increase dairy income even more creating the possibility for the farmers to hire more employees. Dairy income was already presented in Table 75, and was not found to be affected by the intervention. The mean number of paid workers was 3.2 and 2.9 in the treatment area at baseline and end line respectively (results not shown). The equivalen numbers are $1.9 \ \text{and} \ 1.6$ for the control area.

Table 78 presents the results for food expenditures in addition to the number of paid workers Considering the lack of food security in the study area, food expenditures are expected to increase when income rises. Just as we do not find an effect on the previous steps in the result chain, we do not see any effect of the intervention on food expenditures or the number of paid employees.

| | (1) | (2) |
|--------------|--------------------------------------|------------------------|
| | Food expenditures in the past 7 days | Number of paid workers |
| DD | -0.021 | -0.357 |
| | (0.014) | (0.428) |
| Treat | 0.016 | -0.276 |
| | (0.026) | (0.414) |
| Follow-up | 0.030** | -0.292*** |
| | (0.012) | (0.087) |
| Constant | -0.016 | 0.868** |
| | (0.025) | (0.371) |
| Controls | Yes | Yes |
| Observations | 1519 | 1513 |
| r2 | 0.115 | 0.108 |
| ymean | 0.050 | 2.948 |

Table 78 - Food expenditures and employees by UCCCU treatment status

Standard errors in parentheses

Expenditures in 1000,000 UGX. Controlled for wealth, literacy of the household head, dairy cooperative

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membership and cooperative dummies. * p < .10, ** p < .05, *** p < .01Source: Farmer survey data

A proxy for household income is standardized wealth index, generated based on household assets. Recall from section 4.2 that this index is generated using a Principal Component Analysis, and that the index is included in the regression analysis as a control variable due to the significant baseline difference between the treatment and the control group. Table 79 presents a distribution of households in the control and treatment groups by their level of socio-economic status within the sample i.e. wealth index. The results show that, both at baseline and end line, the treatment farmers were relatively wealthier compared to the control farmers. In addition, for both groups, a relatively larger percentage of the farmers were categorized as 'richer' or 'richest' at end line compared to baseline.

| Wealth Quintile 1 | Bas | Baseline (%) | | | End-line (%) | | |
|-------------------|---------------|--------------|---|---------------|--------------|-------------|--|
| | Treatme nt | Contr ol | Diff | Treatme nt | Contr ol | Diff | |
| Poorest | 6.4 | 43.8 | -37.4 | 3.6 | 38.2 | -34.6 | |
| Poorer | 16.4 | 28.9 | -12.5 | 10.0 | 25.7 | -15.7 | |
| Middle Richer | 25.8 28.3 | 25.8 7.0 | $\begin{array}{c} 10.1 \\ 21.3 \end{array}$ | 22.7 26.5 | 14.3 12.3 | 8.4 14.3 | |
| Richest | 23.0 | 4.6 | 18.5 | 37.2 | 9.6 | 27.6 | |

Table 79 - Distribution of households by wealth status at baseline and end line

¹ Due to sampling weights, the numbers in column 1, 2, 4, and 5 (from poorest to richest) do not add up to 100 percent.

The results in Table 80 present the differences-in-differences regression results for the standardized wealth index on the continuous scale. Following the previous findings, the intervention had no significant impact on farmer wealth.

4.4.4.1. Food security

Respondents were asked a series of questions on food security and related aspects four weeks prior to the survey. Table 81 presents a distribution of responses on the aspects at the baseline and end line.

Overall, the proportions of households affirming to having inadequate food as well as households with no food due to resources were relatively higher in the control area. For instance, the proportion of households with at least one household member who had to eat smaller food quantities because insufficient food in the treatment area at the baseline and end line were 18.1% and 7.1%, respectively. The equivalent proportions in the control group were 32.7% and 28.0%, respectively. The percentage of households that had no food at all at any point in the four weeks before the survey remained stable with a percent at baseline and 4.5 percent at end line, while this percentage increase from 5.1 to 12.3 percent respectively in the control group. Whether an improvement in food security can be attributed to the intervention is analysed further in this section.

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| | (1) |
|--------------|---------------------------|
| | Standardized wealth index |
| DD | 0.021 |
| | (0.044) |
| Treat | 1.590*** |
| | (0.339) |
| Follow-up | 0.251*** |
| - | (0.019) |
| Constant | -0.016 |
| | (0.025) |
| Controls | -1.358*** |
| Observations | (0.386) |
| r2 | 1519 |
| ymean | 0.255 |
| | 0.363 |

Table 80 - Wealth by UCCCU treatment status

Standard errors in parentheses. Note that ymean is not zero because the values are weighted. Controlled for literacy of the household head, dairy cooperative membership and cooperative dummies. * p < .10, ** p < .05, *** p < .01Source: Farmer survey data

| Indicators | Ba | seline (%) | | End-line (%) | | |
|--|---------------|-------------|-------|---------------|-------------|-------|
| | Treatme nt | Contro l | Diff | Treatme nt | Contro l | Diff |
| % of household eating smaller food quantities because of insufficient food | 18.1 | 32.7 | -14.6 | 7.1 | 28.0 | -20.9 |
| % of household eating fewer meals because of insufficient food | 13.9 | 24.9 | -11.0 | 5.1 | 22.6 | -17.5 |
| % of household with no food due to lack of resources | 4.0 | 5.1 | -1.1 | 4.5 | 12.3 | -7.7 |

Table 81 - Distribution of indicators of household food security by treatment and control area

Note. Estimates are based on past four weeks prior to the survey

The food security regression analysis focuses on the number of meals eaten yesterday by adults and children under the age of 15 years and a Food Consumption Score that reflects diet diversity.

Diet diversity refers to the number of different food groups households consume over a specific period o time, and relates to households' use of food, or food utilization. The household diversity indicates the economic ability of a household to access a variety of foods. Studies have shown that an increase in dietary diversity is associated with socio-economic status and household food security or energy availability (Hoddinot and Yohannes, 2002; Hatloy et al., 2000). Households consuming a non-diversified unbalanced and unhealthy diet can be classified as food insecure. Dietary diversity can be calculated by measuring how many of the food groups a household consumes over a given period.

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Table 82 shows the percentage of households that consumed any food item in a given food group in the last seven days, for both the treatment and control areas. Overall, the results demonstrate a similar pattern of consumption for most of the food items in both treatment and control group with the exception of fruits. The proportions confirming consumption of fruits in the treatment area at the baseline and end line were 63% and 59.1%, respectively. The equivalent proportions in the control area were 17.6% and 30.5, respectively. Evidently, households in the treatment area recorded higher consumption of fruits compared to their counterparts in the control area.

In addition to recording consumption of the food items, a food consumption score was evaluated. The Food Consumption Score (FCS) is a product of diet diversity and frequency of consumption of different food groups that are normally with similar nutrient content. The resultant product can be used as a proxy to assess the food security status of a community. Data collected was used to establish the FCS in the treatment and control areas. The computation of the FCS was based on the 2008 WFP Vulnerability Analysis and Mapping as follows:

- 1. Sum all the consumption frequencies of food items of the same group and recode the value of each group above 7 as 7;
- 2. Multiply the value obtained for each food group by its weight and create new weighted food groups
- 3. Using the appropriate thresholds record the food consumption as 0-21 poor; 21.5 -35 Borderline and > 35 acceptable

The survey classified foods in terms of their nutrition value: cereals, cassava, sweet potato, matoka (bananas) and oils/fats as the main sources of carbohydrates and energy; pulses/legumes, meat/poultry eggs, sea foods and, milk and milk products for source of protein; and vegetables, fruits as a source o minerals and vitamins. Ten food groups were constituted from the survey data, they include cereals (maize, millet, sorghum and macaroni); pulses (beans, peas and groundnuts); vegetables; fruits; roots representing starchy staples (cassava, sweet potato, matoke and yams); animal proteins (meat, fish chicken); milk products (milk, yoghurt); oils (cooking oil and simsim, ghee and butter); sugar; and spices (salt). The food groups were assigned weights by the relative nutritional importance as given in the Comprehensive Food Security and Vulnerability Analysis (CFSVA) study 2013 by UBOS and WFP Cereals, tubers and root crops are assigned a weighting of 2; pulses a weighting of 3; vegetables, relish and fruit 1; meat, eggs, fish and dairy 4; sugar, oils, fats and butter 0.5.

Table 83 shows the status of the food security of households in both the treatment and control groups based on the computed FCS. Even though the treatment group is wealthier than the control group in terms of assets, the treatment group had 27% households who had unacceptable food consumption at the baseline (i.e. 16% poor and 11% borderline); this is almost four times more than the control group that has 7% of households with unacceptable consumption (i.e. 4% poor and 3% borderline). However, at the time of the end line survey, the treatment group caught up with the control group in terms of diet diversity.

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| Consumption | Bas | eline (%) | | Enc | d-line (%) | |
|------------------------------|-----------|-------------|-------|---------------|-------------|-------|
| | Treatment | Contr ol | Diff | Treatme nt | Contro l | Diff |
| Food Items | | | | | | |
| Cereal | 83.3 | 93.0 | -9.7 | 88.2 | 87.5 | 0.7 |
| Pulses | 87.7 | 87.8 | -0.1 | 96.1 | 88.3 | 7.8 |
| Vegetables | 75.9 | 64.3 | 11.6 | 70.7 | 55.2 | 15.5 |
| Fruits | 63.0 | 17.6 | 45.5 | 59.1 | 30.5 | 28.6 |
| Roots | 88.1 | 79.2 | 8.9 | 91.6 | 82.1 | 9.5 |
| Protein | 57.3 | 46.5 | 10.8 | 60.5 | 25.4 | 35.1 |
| Milk | 86.6 | 91.6 | -5.0 | 71.4 | 81.8 | -10.4 |
| Oils | 53.5 | 68.6 | -15.1 | 46.8 | 67.5 | -20.7 |
| Sugar | 58.1 | 55.9 | 2.2 | 59.2 | 43.0 | 16.2 |
| Salt | 86.4 | 96.5 | -10.1 | 86.2 | 91.3 | -5.2 |
| Food Consumption Score | | | | | | |
| Poor | 16.0 | 4.1 | 12.0 | 4.4 | 2.4 | 2.0 |
| Borderline | 11.0 | 3.2 | 7.8 | 3.3 | 5.7 | -2.4 |
| Acceptable | 73.0 | 92.7 | -19.7 | 92.3 | 91.9 | 0.4 |
| | | | | | | |

Table 82 - Consumption of food items in the last seven days by households (%) by study group

Note. Estimates are based on milk sold in last seven days prior to the survey

The relative increase in food diversity of the treatment farmers compared to control farmers is also seen in the results in Table 83, by the positive DD coefficient. Nevertheless, it is not significant.

Interestingly, despite the limited positive results in the previous steps of the result chain, we still find a significant increase in the number of meals for adults (0.23) and children (0.2) after controlling for confounders and correcting for clustering. Comparing the coefficients to the mean number of meals a day the results suggest that for about every ten adults (children), one adult (child) consumes an extra meal per day. Nevertheless, due to the limited findings on milk sales, it is likely that this effect is caused by other developments in the study areas.

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| | (1) | (2) | (3) |
|--------------|----------------------|--------------------------|-----------------------------|
| | Food | Meals eaten yesterday by | Meals eaten yesterday by |
| | Consumption Score | adults | children under 15 years old |
| DD | 7.318 | 0.230* | 0.199** |
| | (6.355) | (0.132) | (0.088) |
| Treat | -7.789 | -0.022 | -0.110 |
| | (22.096) | (0.479) | (0.458) |
| Follow-up | 1.917 | -0.004 | -0.277*** |
| | (4.712) | (0.110) | (0.015) |
| Constant | 60.127*** | 2.008*** | 2.080*** |
| | (21.731) | (0.078) | (0.093) |
| Controls | Yes | Yes | Yes |
| Observations | 1519 | 1509 | 1392 |
| r2 | 0.209 | 0.165 | 0.099 |
| ymean | 67.751 | 2.459 | 2.383 |

Table 83 - Food security by UCCCU treatment status

Standard errors in parentheses

Controlled for wealth, literacy of the household head, dairy cooperative membership and cooperative dummies. * *p* < .10, ** *p* < .05, *** *p* < .01

Source: Farmer survey data

4.4.4.2. Nutritional Status Children

The evaluation assessed nutritional indicators of children under the age of five (stunting, wasting and underweight) based on the 2006 World Health Organization Anthropometric z-scores. The absolute value of the z-score shows standard deviations from the mean. For example, a z-score is equal to 0 implies the mean. Likewise, a Z-Score of +1 implies 1 Standard Deviation above the mean; a z-score of +2 implies 2 Standard Deviations above the mean. Stunting or low height-for- age is defined as having a height of a least two Standard Deviations (SD) below the median height for a reference population i.e. WHO child growth standards median (WHO, 2006). Stunting (< -2 SD) among children is a strong nutritiona indicator for chronic food insecurity as insufficient calorie intake translates into reduced child growth Underweight or low weight-for-age is defined as weight-for-age below two Standard Deviations (< -2 SD of the WHO child growth standards median. It reflects both chronic and acute malnutrition. On the other hand, wasting is based on standardized weight-for-height scores of less than two standard deviations o the WHO child growth standards median. Low values (< -2 SD) of the score is an indication of acute malnutrition (WHO, 2006).

Similar to the baseline, the end line compiled data on the height, weight and age of one child below five years (< 60 months) in a household. However, a total of 365 children with complete records for the aforementioned variables at the baseline (n = 174) and end line (n = 191) were assessed. The shortfall in number of children assessed was mainly due to the following: refusal by parent to measure the child, no child in the age bracket at the household and absence of the child at the home during the time of data collection. Table 85 presents a distribution of the anthropometric indicators of the children at the baseline and end line stages.

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The proportion of severely underweight children in the treatment group at the baseline and end line were 9.7% and 2.9%, respectively. The equivalent proportions in the control area were 6.4% and 5.6% respectively. Further, the proportion of children who were moderately underweight in the treatment and control group by the end line were less than 3.2%. Overall, this evidence demonstrates that the vas majority of children in the treatment and control area at the baseline and end line were in the normal weight-for-age range.

The percentage of stunted children (severely low height-for-age) is more worrying. The percentage of stunted children in the treatment area is 34.2 and 28.7 percent at baseline and end line respectively, while these number were 32.1 and 35.5 percent in the control area.

Moreover, 79.5 percent of stunted children have a high weight-for-height score. In both areas, the percentage of children with a high weight-for-height was larger than then percentage of children with a normal weight-for-height, at both the baseline and the end line. This means that children are not getting the nutrients that they need, while they do eat many calories.

In addition to anthropometric indicators of children below five years, the study assessed illnesses among children in the past two weeks prior to the survey. Two major illnesses were investigated namely fever and diarrhoea. Table 84 presents a distribution of children who were sick with these illnesses in the past two weeks prior to the survey.

The proportions of children ill with fever in the treatment group at the baseline and end line were 41.5% and 36.6%, respectively. The equivalent proportions in the control group were 53.5% and 58.1% respectively. The proportions with diarrhoea at the baseline and end line stages were relatively higher among children in the control group when compared to the estimates in the treatment area.

| Illnesses | Bas | eline (%) | Enc | d-line (%) | | |
|-----------|---------------|-------------|-------|---------------|-------------|-------|
| | Treatmen t | Contr ol | Diff | Treatme nt | Contro l | Diff |
| Fever | 41.5 | 53.5 | -11.9 | 36.6 | 58.1 | -21.5 |
| Diarrhoea | 10.3 | 29.7 | -19.4 | 9.8 | 13.8 | -3.9 |

Table 84 - Illnesses among children (under five years) at the baseline and end line

Body Mass Index (BMI) for women

The survey took the height and weight measurements for women aged 15 – 49 years who were no pregnant at the time of data collection. Similar to the baseline, the end line evaluation assessed the Body Mass Index (BMI) of women, a simple method to assess how much an individual's body weight departs from what is normal or desirable for a person of his or her height. The BMI is calculated as a quotient o the weigh

(W) in Kilograms by the squared height (H^2) in meters ($BMI=(W/H^2)$). Subsequently, the generated score is categorized by five major groups: underweight (< 18.5), normal range (18.5 - 22.9) and overweigh (> =23.0). Further, overweight is categorized into three groups namely at risk (23.0 - 24.9), moderate obese (25.0 - 29.9) and severely obese (\geq 30.0).

A total of 659 non-pregnant women with complete records of weight and height at the baseline (n = 299) and end line (n = 360) were assessed. The results in Table 86 show that less than two-in-every ten women in the treatment and control group were in the normal weight range. The proportions in the norma weight range in the treatment group at the baseline and end line were 13.3% and 15.1%, respectively. The equivalent proportions in the control group were 16.4% and 9.3%, respectively. The largest percentage of the women are obese. While 49.7 and 46.6 percent of women were obese in the treatment area at baseline and end line respectively, 49.2 and 64.8 percent of women in the control area were respectively.

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| Indicators | Baseline (%) | | | En | | |
|--|---------------|-----------|-------------|-------------|-------------|-------------|
| | Treatme nt | Control | Diff | Treatment | Control | Diff |
| Weight-for-age Z- score | | | | | | |
| Normal weight for age Moderate low WAZ (-2SD) | 87.1 3.2 | 91 2.6 | -3.9 0.6 | 94.7 2.4 | 91.0 3.5 | 3.7 -1.1 |
| Severe low WAZ (-3SD) | 9.7 | 6.4 | 3.3 | 2.9 | 5.6 | -2.7 |
| Height-for-age Z-score | | | | | | |
| Normal height for age | 54.2 | 63.1 | -8.9 | 61.3 | 58.9 | 2.4 |
| Moderate low WAZ (-2SD) | 11.7 | 4.8 | 6.9 | 10.0 | 5.6 | 4.4 |
| Severe low WAZ (-3SD) | 34.2 | 32.1 | 2.1 | 28.7 | 35.5 | -6.8 |
| Weight-for-Height Z-score | - | | | | | |
| Normal weight for height | 45.5 | 41.6 | 4.0 | 38.8 | 43.4 | -4.5 |
| Moderate low WHS (-2SD) | 1.1 | 2.6 | -1.5 | -0.0 | 1.4 | -1.4 |
| Severe low WHS (-3SD) | 7.7 | 6.5 | 1.2 | 2.9 | 7.9 | -4.3 |
| High WHS ($\geq \pm 2SD$) | 45.7 | 49.4 | -3.7 | 58.3 | 48.1 | 10.2 |

 Table 85 - Anthropometric indicators of children below five years (< 60 months) at the baseline and end line [combined sex]</th>

| Body Mass Index (BMI) | Baseline (%) | | | End-line (%) | | |
|-----------------------|---------------|---------|------|--------------|---------|-------|
| | Treatme nt | Control | Diff | Treatment | Control | Diff |
| Under weight | 5.3 | 2.5 | 2.8 | 2.2 | 2.9 | -0.7 |
| Normal | 13.3 | 16.4 | -3.1 | 15.1 | 9.3 | 5.8 |
| At Risk [Obese] | 11.3 | 7.4 | 4.0 | 10.3 | 6.4 | 4.0 |
| Moderate [Obese] | 20.3 | 24.6 | -4.3 | 25.9 | 16.6 | 9.2 |
| Severe [Obese] | 49.7 | 49.2 | 0.6 | 46.6 | 64.8 | -18.3 |

Table 86 - Anthropometric indicators of women (15-49 years) at the baseline and end line

Regression results

The differences-in-differences regression results are presented in Table 87. Children in the treatment area experienced a significant increase in their weight-for-age and weight-for-height. The weight-for-age might be correlated with the significant increase in the number of meals that children ate yesterday as found in Table 83. Although this is a positive results, the increase in weight-for-length is not. Recall from Table 85 that this effect mainly reflects a shift from normal weight-for-height to high weight-for-height.

We also find a significant decrease in the BMI for women, which reflects the increase in the percentage of severely obese women in the control area in comparison to a stable percentage of severely obese women in the treatment area. Hence, this decrease can be viewed as a positive development.

Like the significant effects found for food security, we cannot attribute the effects on nutritional status to the intervention due to the lack of evidence for the theory of change.

| | (1) | (2) | (3) | (4) |
|--------------|-------------------|-----------------|--------------------------|--------------|
| | Weight-for-age Z- | Length/height- | Weight-for-length/height | BMI (women > |
| | score (children | for-age Z-score | Z-score (children <5yr) | 15 yr) |
| | <5yr) | (children <5yr) | | |
| DD | 1.425^{**} | 0.147 | 13.410^{*} | -14.832* |
| | (0.538) | (1.042) | (7.112) | (7.463) |
| Treat | -0.904* | 3.942 | -53.471* | 7.657 |
| | (0.497) | (5.626) | (30.343) | (14.530) |
| Follow-up | -0.347** | -0.015 | -10.785*** | -3.490 |
| 1 | (0.142) | (0.500) | (2.210) | (4.495) |
| Constant | 0.194 | -2.513 | 36.600 | 13.572 |
| | (0.793) | (6.056) | (32.268) | (13.400) |
| Controls | Yes | Yes | Yes | Yes |
| Observations | 351 | 353 | 340 | 646 |
| r2 | 0.304 | 0.277 | 0.383 | 0.126 |
| ymean | 0.545 | -2.223 | 12.736 | 39.601 |

Table 87 - Nutritional status of women and children by UCCCU treatment status

Standard errors in parentheses

Controlled for wealth, literacy of the household head, dairy cooperative membership and cooperative dummies. * p < .10, ** p < .05, *** p < .01

4.4.5. Additional cooler effect analysis results

Appendix G contains the tables that present the results for the 'Additional cooler effect analysis', because few of these results differ substantially from the 'UCCCU treatment analysis' results. Using the UCCCU treatment definition might underestimate the treatment effect given that some cooperatives from that treatment group did not receive a cooler, because of discrepancies between intervention planning and execution. It is also possible that the farmers around those cooperatives did not receive training from aBi-Trust, although we cannot confirm this based on the data.

The underestimation of the treatment effect by the UCCCU treatment definition is confirmed by the results of adoption of the training for the 'additional cooler' treatment definition. Using the latter, we find significant adoption of skills in animal health management, animal breeding, animal nutrition and vaccination, compared to no significant adoption results for the UCCCU treatment definition²⁰⁴. Hence, it seems that the skills taught

²⁰⁴ Only a significant increase in knowledge in vaccination skills was found.

during the trainings were used more by farmers living around a cooperative that received an aBi-Trust cooler than around cooperatives without an aBi-Trust cooler.

Another difference with results discussed in the previous section is that the 'additional cooler' treatment farmers significantly increased the share of milk used for their own consumption by 5.7 percent, while selling a smaller share of their milk to traders and processors²⁰⁵. This might have something to do with the drought, although this is only a speculation.

Furthermore, while the previous section found a significant positive effect on the number of meals eaten per day by adults and children, these coefficients are no longer significant. This suggests that the farmers that live around cooperatives that did not receive an aBi-Trust cooler drove the positive result for number of meals eaten yesterday, and that the effect cannot be directly attributed to the programme. Instead, the Food Consumption score now turned slightly significant with a coefficient size of 14.

Considering the nutritional status indicators, the effects on weight-for-height of children under 5 years old and on BMI for women over 15 years old are no longer significant, while the impact on the weight-for-age of children under 5 years old remains stable with a coefficient of 1.5 compared to 1.4 in the UCCU treatment analysis.

Nevertheless, we do not find other results further in the result chain. The main assumption about the aBi-Trust coolers at the cooperatives is that they increase the cooperative capacity and that part of the profit is passed through to the farmers through higher prices. However, also in this 'additional cooler analysis' we do not find an increase in the share of milk sold to the cooperatives nor on the prices received, even though the coefficients are twice as large as the UCCCU treatment coefficients and the largest coefficient is found for cooperative prices.

Ultimately, we do not find that the coolers in combination with the trainings resulted in improved production and sales for the dairy farmers.

4.4.6. Conclusion

We did not find any evidence for increased cooperative profits because of the coolers, so no benefits we could be passed through to the farmers. In fact, we find that the cooperatives that received a cooler bought their milk for a significantly lower price from the farmers, although we do not see this decrease in the results of the farmer analysis. The lower price paid to the farmers is likely to be due to the loan repayment, that is deducted from the price.

Considering the UCCCU treatment status, although the farmers that were assigned to the treatment group received more training than the control group and increased their knowledge mainly in vaccination skills, this did not result in any positive effects further in the result chain. Nevertheless, using the 'additional cooler' treatment definition, the results that the farmers living around cooperatives that received an aBi-Trust cooler adopted the techniques taught during the trainings. We still did not find any other results further in the result chain.

4.5. Review and Discussion

This study utilizes a quasi-experimental design to evaluate the impact of the aBi-Trust project, particularly regarding the project interventions on dairy cooperative empowerment and households' food security and welfare. The aBi-Trust interventions were implemented in the treatment area comprising eight districts in the south-western region: Kiruhura, Ibanda, Mbarara, Isingiro, Ntungamo, Rukungiri, Kabale, and Sheema. The control areas are Kyankwanzi and Kiboga districts in the central location milk shed - no project interventions were implemented in these areas. A baseline survey was undertaken in April 2014 to provide baseline information on the project indicators. Subsequently, an end line survey was conducted in July 2016 to facilitate the measurement of the impact.

²⁰⁵ The decrease in the shares of milk sold to traders and processors are not significant.

The theory of change posits that the aBi-Trust coolers improve the bargaining position of the dairy cooperatives with respect to their clients, as the cooperatives now own the coolers whilst they rented coolers from their clients before the intervention or had none. In addition, the cooperatives would be able to collect more milk, particularly evening milk, by expanding the cooler capacity. In other words, the intervention was expected to increase both the amount of milk sold by the cooperatives and the price for that milk, so that milk revenues would rise. The farmers, in turn, would benefit from this through higher milk prices paid by the cooperatives as a result of the increased milk revenues.

By providing training in milk production and hygiene to the farmers, the intervention also aimed to improve milk quality. This would limit the amount of milk rejected at the milk collection centres, so that farmers are able to sell a larger part of their produced milk at attractive conditions. Ultimately, the intervention intends to increase farmer income through provision of equipment and training.

The evaluation investigates a series of indicators at both the cooperative and farmer level. The indicators at the cooperative level are asset ownership, operation and maintenance; cooperative management and governance; and cooperative business transactions. The farmer level indicators are organized under six major themes namely: membership to cooperative society and training; dairy production and utilization; dairy income and expenditure on dairy production; farm employment; production capacity; and wealth and nutrition.

4.5.1. Summary of findings

In the cooperative analysis we study volumes of milk bought and sold and the corresponding prices, comparing months with and without the programme cooler. The analysis gives a number of significant results.

The effect of the coolers on aggregate volumes bought and sold and collection of evening milk is not significant, but we do find quite substantial diversion of trade towards "other processors". During the study period, a new milk-processing factory called Pearl was established which may account for (part of) this diversion.

Moreover, the results show a decrease in the price of about 50 UgX per litre. This is likely due to cooperatives deducting the loan repayment for the coolers from the price of milk paid to the farmers.

We do not find an effect on the price of milk sold. However, the results show a significant decrease of 103 UgX in the price per litre paid by Sameer after installation of the programme coolers. The effects on prices paid by other clients were insignificant. This suggests that the coolers did not increase the bargaining power of the cooperatives within two years. The effect on revenue from milk sales is even significantly negative. However, note that the data contains many missing values in both the price and volume data. For months with missing volume and price data for certain clients, we assume that there were no sales to those clients (see section 3.3). If this assumption is wrong and milk was sold in those months to those clients, it creates a downward bias in the results.

Finally, we find no evidence for a positive effect on the cooperative business transactions.

At farmer level, we find significant self-reported adoption of techniques in animal health management, animal breeding, animal nutrition and vaccination (using the 'additional cooler' treatment definition in). However, we find limited improvements in the materials that the farmers use for their milk production and no effect on the expenditures on dairy production equipment. However, using materials such as milk sheds and paddocks requires investments. It is likely that the farmers did not have the resources to make this change, especially given the limited findings at the cooperative level regarding the volume and price of milk sold by farmers to the cooperatives.

Despite the installation of coolers at the cooperative and the positive effect on self-reported adoption of a number of dairy production techniques, we find no impact on sales of evening milk, milk production, volume and prices of milk sold nor on dairy income. Interestingly, there are positive and significant results for farm household food security. The effect on the number of meals eaten yesterday by both adults and children is significant when using the UCCCU treatment definition, but not when using the 'additional cooler' treatment definition. However, using the latter, there is a marginally significant positive effect on the Food Consumption Score of 14 points. However, the limited findings in the previous steps of the result chain make attribution of the positive effects on food security to the intervention unlikely.

Summarizing, we do not find supporting evidence for the theory of change. Hence, the intervention was successful in creating awareness among the farmers about techniques to improve their milk quality, but it did not have impact on the farmers further in the result chain.

4.5.2. Discussion: why do we find limited evidence of impact?

We review reasons that help explain the limited evidence of impact at the cooperative level. We distinguish between three sets of explanations, respectively relating to theory of change and implementation; evaluation design; and data quality.

We start with program logic and implementation. First, some cooperatives may have used the aBi-Trust coolers to replace existing (Sameer) coolers. We have reported an impressive average expansion in cooler volume at the start of Chapter 3, but this assumed that aBi-Trust coolers were additional, not replacements. The possibility of cooler replacement means that the daily production process may have remained unaffected for a number of cooperatives, despite the intervention. Second, it could be that cooler capacity was a constraint but only one of a set of binding constraints. With other potential constraints still in place, for example, lack of operational or marketing skills, the increased cooler capacity does not lead to significantly increased volumes. Third, the coolers were provided to cooperatives partly as a loan. Cooperatives cover the loan repayment by reducing the price paid to farmers. As a result, farmers may prefer to sell their milk to other clients and cooperatives can only increase their sales if they can increase their milk purchases.

At the level of the evaluation design, three factors appear relevant. First, the cooperative sample is relatively small while impacts between individual units (cooperatives) vary substantially. This means it is more difficult to precisely estimate the mean effects. Second, the survey can only estimate effects over a two-year period. It is possible that the treatment is effective and the theory of change is correct, but it takes more than two years for increased production capacity to translate into substantially higher equilibrium market shares for the treated cooperatives. Moreover, the end line survey took place in July while the baseline survey was in April. Seasonal differences between these months could influence the results. Third, the treatment and control areas were selected from different districts and for a number of variables showed significantly different baseline measures. While differences in baseline levels (of outcomes) between the control and treatment group are not problematic for the differences of treatment. The common trend cannot easily be tested. Nevertheless, the two groups are fairly different. The control areas are not organized in dairy unions. In addition, the control area is more dependent on milk than the treatment area. The farmers in the treatment area often also grow matoke. We would expect that these differences would result in over- rather than underestimation of the treatment effect. As there are limited positive findings, this seems to be a minor issue.

There are limitations in terms of data quality too, including missing data. This generally increases variance and makes it more difficult not to reject the null-hypothesis of no impact. In particular, the cooperative level survey data contains many missing values. As mentioned in section 4.3.3, the assumption that missing values for both the price and volume of milk sold in a certain month for a particular client means that the cooperative did not sell any milk in that month to that client might create a downward bias in the result for volume of milk sold. The assumption applies to relatively more months with an aBi-Trust cooler compared to months without the coolers.

Finally, some unanticipated events took place. The construction of the Pearl factory increased competition for the cooperatives. This could prevent the cooperatives from attracting farmers to sell them more milk. Additionally, a dairy cooperative society disintegrated in the control area.

4.6. Conclusions

This report analysed the support provided to the UCCCU dairy cooperative to increase quality of milk and access to markets. To this end, the project provided cooperative members training on milk production and processing and equipment to ensure a cold chain to large vendors. The result of the analysis shows that the project delivered the promised goods and services. Around 50 percent of members received training in the past year. The cooler capacity increases by more than 4500 litres on average, from a baseline capacity of about 500 litres.

The analysis also shows that the project did not yield the anticipated benefits for farmers over the period of the study from March 2014 to July 2016. The estimates for prices or volume of milk sales of farmers show no significant impact. The cooperative data indicate that the price paid to farmers even decreased, probably as a result of loan repayments required by members for the newly installed coolers, which were provided on a co-financing basis.

Maybe it requires more time for positive results to materialize. Adjustments in herd sizes take time and require investments by farmers, which may only take place if it cooperatives start paying better prices for the milk that is delivered. This should be a focus of the program.

The study also had some weaknesses in the sense that the control and treatment groups were not as comparable as hoped, and that in particular for the cooperative data, data on sales and price were often not recorded. While these issues weaken the confidence in the unbiasedness of the results, they are unlikely to overturn a positive impact all together.
5. Synthesis

Based on the document review, field visit and additional desk research all available information has been analysed and triangulated in order to answer the evaluation questions. By answering the research questions we can draw conclusions on the extent to which the overall Dutch food security policy objectives of the security policy letters have been met. Based on the conclusions we make reflections and recommendations for EKN. Finally, we test the hypotheses developed after the IOB food security evaluation workshop.

5.1. Conclusions

5.1.1. EQ1: Composition and motivation of Dutch food security programme

Food security was a new programme for EKN Kampala. Although EKN had its strategy ready in 2012, it used 2013 as a start-up year and the complete intervention logic was first described in the MASP 2014-2017. The objective is clearly described in the MASP and aligns with that of the Government of Uganda to move the country from an economy centred on small-scale agriculture towards a more industrialized middle-income country, being led by the private sector. The first projects in the portfolio were selected in 2012. Most projects have a clear food security objective. In the 2014-2017 MASP the focus on economic cooperation was made explicit in the EKN programme and the synergy between food security and economic cooperation has been captured in the intervention logic presented in the MASP. The added focus on economic cooperation seems to have come at the cost that for several projects the implementers did not define clear food security objectives at the start of the project. In our view, this would have been advisable since it would allow for better monitoring on food security results and for continuously steering the projects towards these objectives during their implementation.

The strategy of EKN is mostly in line with the country context of the food security situation as presented in Chapter 2. The decentral programme of EKN focuses on youth inclusion, value chains, and production increase, which are important concerns in Ugandan society were youths are disillusioned with agriculture, market integration is limited and rapid population increase demands domestic production of large food quantities. As was described in Chapter 2, the Northern region is the poorest and most food insecure of Uganda. Although the North-eastern region, which is by far worst off in terms of food security, is not targeted by the Dutch food security programme, the rest of the North, the East (second worst in terms of food security) and the Southwest are targeted. Population growth is another concern for Uganda. This theme is only sparsely covered in the project portfolio, through training on SRHR. However, indirectly EKN's focus on access to food and increased food production is another approach towards overcoming the anticipated growth of the availability gap.

The focus of the Dutch Foreign policy and EKN's strategy show a strong link with the targets of the Government of Uganda and the alignment between the food security programme and the government's policy strategy is evident. Furthermore, the government of Uganda holds the opinion that development of the agricultural sector should be private-led. This is also related to the fact that MAAIF has a lack of means to stimulate or otherwise influence this sector itself. EKN shares this opinion and has directed its efforts towards stimulating the Ugandan private sector. This shows in the many projects that are aimed at commercialising farmers and farmer groups and connecting them to markets. Furthermore attention is paid to trade conditions via the intra-regional trade project which correlates with the focus on foreign investment in the strategy of GoU. Finally, an important difference is that nutrition and food intake at the level of the individual food insecure citizen are prominent in the GoU strategy but are not included in the focus of EKN. The same goes for the importance of job creation in itself, which is a core goal for GoU but is less at the forefront of the EKN programme.

5.1.2. EQ2: Instruments and synergies in Dutch food security programme

The primary instrument of the programme are the grants to implementing organisations. The programme uses a diverse selection of channels, including multilateral cooperations, international NGOs, knowledge institutes and private sector. Private sector development (PSD) is a central approach for most channels. Activities aimed at PSD include institution building, construction works, value chain integration, and capacity building of farmers. Four of the nine projects are funded and implemented together with other development partners. The synergies within the programme are essential for EKN, and EKN's perception is that the most successful projects are those that link Value chain development to institutional change and activities addressing restrictions to commercialization. This logic is integrated in the portfolio, which contains a mix of projects targeting each of these conditions (farm level, institutional, commercial environment). Making the categorisation of these projects explicit in this evaluation has made the (potential for) 'farmers-level – enabling environment' synergies clearer. The second form of synergies in the programme exists between economic cooperation and food security, both of which EKN integrated in a single intervention logic. At least two of the projects make more sense from the economic cooperation viewpoint (i.e. Financial inclusion and Intra regional trade), since only a small part of these projects is dedicated to food security. However, based on synergies with projects targeting food security, the inclusion of these projects becomes clear. On the other hand, the projects focused primarily on food security have been stimulated by EKN to target economic cooperation where possible, mainly by promoting 'farming as a business' and value chain integration. As a result the trainings of farmers has become more relevant to the markets (e.g. in CATALIST and ISSD).

EKN has taken the initiative to stimulate portfolio project implementers to connect in order to form synergies with bi-annual meetings (as part of the KAM Support Fund). Other relevant stakeholders and project implementers have also been invited to these sessions, including Dutch businesses and implementers of centrally managed Dutch programmes. New partnerships have followed from this interlinking, such as ISSD with PASIC. Others have not worked out, such as Financial inclusion with ISSD. The integration with other donor programmes and with the programmes of the government of Uganda have to a large extent been realized. An example of this is Agri-skills, which works with several education programmes and government institutions. Financial inclusion depended on the work of Value chain projects to provide access to financial services. On the other hand, ISSD had its own policy influence component but greatly benefited from the work of PASIC to advocate changes to the seed policy framework. Most outcomes were results from individual projects, but the cooperation between the projects, for example CATALIST and ISSD, have made some tangible differences. However, there are still possibilities for synergies not utilized. We therefore advise to maintain the focus on synergies as part of the strategy of EKN and actively foster and formalize partnerships when appropriate.

5.1.3. EQ3: Costs per beneficiary and cost per output

In determining the costs and the benefits for the programme in terms of number of beneficiaries and costs per project over the evaluation period we came across several difficulties. First, the definition of beneficiaries between EKN and IOB differed. In a strict sense IOB refers to the food insecure as beneficiaries. EKN defined small-holder farmers as the key target group. These farmers are not always food insecure. Information on the number of food insecure that benefited from projects was not systematically collected. In line with the definitions used by EKN as well as IOB, we have taken the project beneficiaries to be those (rural) people targeted by the projects. Secondly, not all projects directly target the (rural) population and the analysis can therefore not be done in a comparable manner between all projects. We have therefore decided to separately and more qualitatively report on the stakeholders targeted by the policy enabling projects and to focus the costbenefit analysis on projects with direct beneficiaries only. Thirdly, at the time of the endline data collection (July 2016) most of the projects were still ongoing, albeit in the final stages. The total amount spent by EKN was thus not final. Also, projects did not report on how much they received, which will probably only be done in their endline reports to EKN. Fourthly, and related to the previous point, for several projects the total number of beneficiaries was not final and one of the projects (Financial inclusion) was only half way along in its implementation. Fifthly, information on the number of direct and indirect beneficiaries was not always available, especially because no final reports were available at the time of the endline. We thus collected information from different sources for an accurate estimation. Lastly, EKN was not the only donor and the benefits from the funding could not be attributed to EKN funding alone. We have therefore chosen to use the total project costs and total numbers of beneficiaries reached. Considering these limitations and our approach to overcoming these where possible, we have calculated the costs-per-beneficiary, and presented the results in Section 3.5.2.

Over the programme as a whole at least 200,000 direct beneficiaries have been reached and the costs per beneficiary are roughly \in 600. The project with the lowest number of direct beneficiaries was KAM Support Fund (around 4,000). The project with the highest number of beneficiaries reached was CATALIST Uganda with over 70,000 direct beneficiaries. The costs per beneficiary is lowest for ISSD, namely \in 106. However, if only the farmers who have received training are counted, ISSD has a lower number of beneficiaries and thus higher costs per beneficiary. Based on these estimates, ISSD can be considered most cost-effective and

CATALIST can be considered most successful in reaching the rural population, many of whom are food insecure.

A comparison of the costs per beneficiary reached between enabling projects and Value chain projects is not meaningful, because of the conceptual differences in the intervention logic of both types of projects. It is also important to note that the intensity of training differed greatly between farmer-level projects and enabling projects, with farmer-level project beneficiaries often receiving very intensive training.

5.1.4. EQ4: Effects of the programme on food security

Among the projects in the programme, only 6 out of 9 projects targeted food security explicitly. Particularly the projects that contribute to the enabling environment (infrastructure and access to finance) did not have an explicit food security objective (in terms of directly targeting the food insecure) and therefore reported and monitored outputs that are not useful in this analysis. The specific food security effects on beneficiaries were discussed during the interviews with project staff, but their conclusions on the projects' relation to food security are not supported by evidence. Examples were presented but structural data on beneficiary and food security level was not collected. Project implementers were aware of the food security focus of EKN programme. However, they were not required to report on this in their annual reports or mid-term reviews. Also, project implementers have not reported on their project's contribution to the three EKN food security outputs. We have collected indirect evidence from the available reports. If the projects would have reported on this information, including monitoring of the number of beneficiaries, this would have made a more accurate assessment possible. On the other hand, outputs monitored by projects do cover several of the (proxy) output indicators set by IOB and the MASP. Another restriction is that baseline measurements at outcome level at the start of the projects were not collected. This makes comparing results and interpreting the significance of outcomes at the end of the results chain difficult.

| Project | FS objective | Benefi- ciaries | Food Availability | Food access | Food stability | Food Utilisation | PSD |
|----------------------------|-----------------|--------------------|----------------------|----------------|-------------------|---------------------|-------------|
| CATALIST | Explicit | 70,000 | Highly | Likely | Likely | - | Several |
| ISSD | Explicit | 55,000 | Highly | Likely | No evidence | Likely | Likely |
| Agri-Skills | Explicit | 12,250 | Likely | Likely | Likely | - | Likely |
| aBi-Trust | Explicit | 10.000 | Limited | Some | Some | Likely | Likely |
| Intraregional Trade | Implicit | 20,000 | No evidence | Some | No evidence | - | Highly |
| Financial inclusion | Implicit | 36,000 | - | No evidence | No evidence | Not directly | Several |
| KAM Support | Indirect | 4,000 | No evidence | Several | Likely | Some | Several |
| Operationalization DSIP | Indirect | N.A. | No evidence | Low | Likely | No evidence | Very low |
| PASIC | Indirect | N.A. | Very low | Some | Low | Low | Very low |

The findings on the effectiveness per project have been synthesized in the following table:

Table 88 – Synthesis of portfolio food security effects

5.1.4.1. Direct beneficiaries: Value chain projects

Overall the value chain projects at the farmers-level have contributed to better food availability and access to food by improving productivity and incomes for farmers. The degree to which they have contributed to food stability and food utilization is less evident. Private sector development was central to these projects but has only partly been accomplished. Especially Agri-skills and CATALIST encountered difficulties in integrating the project in existing value chains. Output 1 'Improved performance of selected agro-food value chains and actors' was realised for different agro-food value chains. This primarily includes the farmers that perform better and are more connected to markets. Value chains have been strengthened and the link from farmers to the private sector, to processors and bulk buyers has been established. Due to the projects, farming practice in the respective value chains has significantly changed and new value chains actors have been created where these were missing (e.g. seed producers). Especially at this level it is very likely that food insecure people have been reached, due to the locations and because of the relatively high degree of women and youth included.

Unfortunately this was not structurally measured, so supporting evidence is limited to reported narratives and data from the Focus Group participants.

The biggest gains to food security could result from the creation or entrance of markets that had previously not existed, at least in the region (such as horticulture, animal farming and seeds production) and the formation of a new group of rural entrepreneurs. This could strengthen the stability of the income of the farmers and could also contribute to a diversity in the supply of products. In itself, the supply side strengthening has improved conditions for the beneficiaries, but even larger wins would come from a corresponding improvement in the demand side. The difficulty in finding buyers (e.g. for seed) and linking to agri-businesses (for bulk produce) forms a risk for sustainability of the food security improvements after the projects.

5.1.4.2. Direct beneficiaries: Value chain projects

Overall the value chain projects at the farmers-level have contributed to better food availability and access to food by improving productivity and incomes for farmers, while for some projects, including aBi-Trust this was found not to be the case. Also, the degree to which they have contributed to food stability and food utilization is less evident. Private sector development was central to these projects but has only partly been accomplished. Especially Agri-skills and CATALIST encountered difficulties in integrating the project in existing value chains. Output 1 'Improved performance of selected agro-food value chains and actors' was realised for different agro-food value chains. This primarily includes the farmers that perform better and are more connected to markets. aBi-Trust has been able to establish a cold-chain for milk, increasing the cooler capacity manifold and making it financially viable for cooperatives. Value chains have been strengthened and the link from farmers to the private sector, to processors and bulk buyers has been established.

5.1.4.3. Indirect beneficiaries: enabling projects

With regard to the policy enabling environment, the programme has made modest contributions in strengthening other stakeholders, making institutional contributions that affect the agricultural sector, and removing restrictions and bottlenecks to the agro-value chains. The work to influence policies and frameworks was not as impactful as anticipated, and the most concrete result, approval of legislation, is in an advanced stage but also currently still pending. Several by-laws have been passed (by PASIC and Intra-regional trade) but their effectiveness will depend on enforcement. Especially the mobilization of stakeholders in platforms and meetings and the cooperation and strengthening of relevant government institutions such as ZARDI's (by ISSD) has been impactful. The sustainability of the improvements to the enabling environment appear limited as dynamics for change have not been carried over, and were ad-hoc (PASIC) or one-off (Operationalization DSIP).

Output 3 'Dutch trade and investment promotion in the area of food security is enhanced', has only been contributed to by KAM Support Fund. This project was implemented by EKN and it covers both objectives of economic cooperation and food security. New Dutch agri-businesses have been introduced to Uganda, and through several activities the programme has been successful in making a name for the Dutch agricultural expertise in Uganda and for enticing Dutch businesses to explore business opportunities in Uganda.

Aggregated to the programme level, the portfolio of projects has mainly benefited household food access. On an institutional level results are rather limited. On the individual level of food consumption it has not been possible to determine the realized change. It is likely that amongst the beneficiaries are many people who are in some way food insecure. The infrastructure developments have benefited all users and the programme focused on areas were food security is highest. A more structured and integrated effort to realize institutional improvements to food security could contribute to more fundamental transformations.

The sustainability of all projects have been assessed. ISSD scores high and contributes to lasting changes to the sector. Other projects such as PASIC and Financial inclusion score low on sustainability. It is highly uncertain if Financial Inclusion will continue the food security activities after the project has ended while for PASIC the lobby activities and capacity building of MAAIF are not institutionalized. With regard to environmental sustainability CATALIST and ISSD are at least partly contributing to this. Overall the programme will likely have lasting effects on the food security situation.

Lastly, the unintended negative effects form risks for food security that should be seriously considered. Some could be addressed, including the high interest rates in the case of the Financial Inclusion program. From a food security perspective these are not favourable services and could even reduce food security. Also, aBi-Trust shows that prices paid by cooperatives to farmers might not always increase, even if production improves, which could have to do with increased costs for using the introduced technologies and materials.

5.1.5. Reflection and recommendation EKN food security programme

EKN used the intervention logic to set out the different pathways to food security. The highest goal in the programme was sustainable access to food. This is a clear target and fits with the dual focus on food security as well as economic cooperation. The intervention logic is an ambitious effort to integrate a diversity of factors influencing food security. It appears to be mostly tailored to the type of projects that have been included in the programme. The outcome 3.1 'public functions' represents an important share of the enabling environment and regarding the intended synergies. In the programme this takes a prominent place with two projects dedicated to this and other projects making contributions. The intervention logic, however, does not represent this importance well. In its approach the EKN could be more clear on the pathways through which influencing public institutions and policies could operate.

The synergy between economic cooperation and food security is a precarious one. A focus on economic cooperation easily leads to targeting those people with most potential, who might already be in a position to make the step towards successful farming. Food security however is an issue of the poorest. There is an added risk of increasing inequality. Leading the least food secure to worse food insecurity. Not focusing on the North East, the most food insecure region, is an example of this. It is clear that many other donors and programmes do focus on this region, thus in that light, the strategy of EKN is understandable. The approach of EKN is based on a longer term vision, to contribute to economic development, with benefits for all of society. EKN could consider describing in its strategy how the food insecure would actually be reached and requesting from development partners that this is clear in their project strategies in the implementation by projects this could then be better monitored, also through documentation of the baseline on food security levels.

The reporting of results by projects is not completely aligned with the objectives of EKN regarding food security. The cross-cutting themes are not commonly reported on, and include gender, youth and climate change. A more structured approach to reporting could enable monitoring on all aspects that are central to current and future food security. In this respect EKN could take more of a leading role and for example establish common indicators on the most important themes or set certain definitions, for example the definition of "smallholder farmer" was not uniform. This could also promote the sharing of knowledge and experience, for example most projects were in some way working with youth and women, yet all projects were developing this in their own way and were not aligned on this. While exchanging experiences and guiding these projects in their approach would have equalized the playing field in this sense. A concrete example shows from projects that provide intensive training and still had to find out that working with women works better if day-care for their children is included, while others have included this from the beginning. These small differences can seriously affect the reach of the programme. A more leading role from EKN in providing more clear reporting requirements was also welcomed by some if the interviewees.

The sustainability of many projects is an important concern. EKN considers sustainability mainly as a result from successful private sector engagement in projects, integrating the activities with existing value chains. For several projects where sustainability is indeed dependent on private sector demand for the new activities, the private sector engagement is not guaranteed. A greater emphasis could thus be placed in the programme on the demand side. This can be done either through market studies to determine what skills, resources and products are most needed from a demand perspective and developing projects accordingly or by focusing projects on capacity building in the other actors in the value chain (processing, distribution etc.). Another important risk are construction projects in which responsibility for maintenance is carried over to the government, but not ensured in the government's budget. The limited sources and lack of committed funding run the risk that the facilities and roads will not be maintained properly. Public-private partnerships might be a solution to overcome these risks, but they do require solid and reliable agreements on maintenance between all parties involved to be a guarantee for sustainability of project results. Several former PPP still require a form of government support to continue enabling the projects and stimulating the activities when the private sector is hesitant. This is the case with the buying of seeds from the ISSD project. Without the government programme to buy seeds, the current scale of activities might not have been reached. This gave the project time to stimulate the purchasing of seeds by farmers directly, which is still to be achieved on the same scale as was reached through government purchases. On the other hand, in the case of infrastructure projects, the buy-in of private stakeholders benefiting from the facilities could enhance the facility's durability. PPP is thus a type of partnership which could be further explored by EKN in its future programmes.

Additionally, it is important to consider the potential down-sides that might be associated with promoting use of inputs such as financial loans and equipment that is bought using a loan. Either for individual farmers or for cooperatives. If the inputs do not (directly) have the intended production and revenue increasing effects, it could actually lead to lower net earnings, lower prices being paid to farmers and a reduction of food security. Promotion of these interventions should therefore not be indiscriminately done but rather based on a good understanding of the risks and probability of success, taking into account the specific context.

Furthermore, the continuation of some projects is only guaranteed by a new proposal that is prepared by the (International) lead party of the organisation, in this sense projects stay dependent on the support of EKN or other donors. The focus should be more directed to gaining incomes from other sources as well as gaining incomes through Ugandan partners themselves. The Ugandan partners should be equally in the lead and not be a subcontractor or only implementing partner to the larger and mostly western lead partners. This would also strengthen the ties between EKN and Ugandan community and create more ownership with the local stakeholders.

The realized synergies within the portfolio could have been more effective. While there were some deliberate linkages, the partnerships were still relatively 'loose'. More structured cooperation within the projects, but also with other organizations and stakeholders, could be considered between Value chain projects and enabling projects. The current focus throughout the portfolio on promoting farming as a business and access to food allowed the differing projects to create important synergies and allowed the programme to remain manageable for EKN. EKN will most likely include Land rights and Nutrition in the new programme. We advise EKN to guard itself from making the portfolio too diversified, with topics that do not provide very strong opportunities for mutually enforcing cooperation.

5.2. Hypotheses

During the end-line preparation workshop, IOB asked the evaluation teams to present a number of impact pathway hypotheses and approach hypotheses.

5.2.1. Impact hypotheses

As described in the Multi Annual Strategic Plan (MASP) the overarching goal of the Dutch Food Security Programme in Uganda is increasing food security through stimulating sustainable production and the efficient functioning of markets and the creation of an enabling environment for agribusiness development, including skills development for women and youth. In that light the hypotheses below have been tested.

1. Improved performance of selected agro-food value chains and actors will result in indirect food security effects: increased demand for labour and / or reduced costs of food for net consumers.

Although very cautiously, the outcomes from the programme suggest support for the hypothesis. There is evidence that suggests that demand for labour has improved due to the programme. In the first place due to construction projects and the need for additional staff in the border posts, however these are both examples of jobs that have the risk of being temporary in nature. In value chain projects increased production has led to the need for processing, which provided labour opportunities (in the case of ISSD and CATALIST youth were stimulated to fulfil this positon). However from the FGDs it also became clear that additional income through job creation or better economic circumstances is rarely spent on food. Therefore the relation with food insecurity remains insecure. Regarding food prices, our country analysis in chapter 2 demonstrated the link between high food availability and low food prices around the harvest season. Significant quantities of marketable food have resulted from the projects causing a larger supply of food. This suggests that food prices in Uganda will further decrease because of the projects. Yet no evidence is found for this from the project analysis, part of the additional harvest could also have been exported. 2. Enabling environment is conducive for agribusiness in general and the selected agro food value chains resulting in increased private sector investment.

The first part of the hypothesis receives support from our analysis, but the second part does not. There are still many restriction for agri-businesses to operate in Uganda. With the enhanced border posts some of these have been taken away, but there is no evidence that this has resulted in increased private investment. With regard to financial services, Financial Inclusion did target agribusinesses with loans and increased its agro-customer base. This suggests that investments by some agro-businesses have been facilitated. Although the Operationalization DSIP detailed the key opportunities for investment in the Ugandan sector, private sector investment stayed out. For farmers and farmer investments, in many ways the environment is not enabling: finance is expensive for farmers, infrastructure is lacking, value chain integration for farmers and farm groups and access to larger markets is difficult, and land rights remain an issue. Land rights were however not a focus of the Dutch food security programme.

3. Dutch trade and investment promotion in the area of food security facilitates the exchange of information/consultative processes in the area of agribusiness.

This hypothesis is supported. KAM Support promoted investment and trade. The project, and EKN in general, undertook many activities to change the perception of Uganda and to show its potential. On a farm as well as agri-business level exchange of information was facilitated. Some of the introductions have resulted in continued business relations. The popularity of the country for foreign investors has improved as well, as can be seen from the Doing Business 2016 ranking where Uganda rose to position 122 compared to 2015 where she was at 135²⁰⁶.

5.2.2. Approach hypotheses

In the conclusions of the workshop, IOB described the hypotheses below which are also related to the ToR and should be covered in the reports.

1. EKN assures synergy between the Dutch activities: between delegated and centrally funded projects, between multilateral and bilateral funded projects.

The first part of the hypothesis is correct, between the delegated projects synergies were realized. With the centrally funded projects no cooperation have occurred. For multilaterally and bilaterally funded projects within the programme, the cooperation with other Dutch activities outside of the programme were thus not observable. Also no extensive cooperation with multilateral institutions existed. The only exception is cooperation with the World Bank, which was the co-donor and initiator of the Operationalization DSIP project.

2. EKN assures synergy between the Dutch FS programme and the programme of other actors (Government of Uganda, main other donors).

This hypothesis was not supported, as there is only very limited evidence of interaction between the activities within the programme and programmes by other donors. When these have occurred they were often more the result of cooperation at the project level, and less due to EKN's stimulation.

- 3. There is synergy between FS and other Dutch policy objectives:
 - a. Involvement of Dutch expertise and private sector result in win-win situations.

This hypothesis is supported. Much is being done through the KAM support fund to engage Dutch expertise and private sector. For example in the introduction of new potato varieties, which are expected to increase yields, and have resulted from consultation, and involvement of agro-business.

b. PPP leverages longer-term private investment contributing to FS.

This hypotheses is not supported. As mentioned in the reflection and recommendation, the leveraging of publicprivate partnerships has not been a strong component in the programme. The Operationalization of DSIP was a joined public-private effort, since the studies were developed by agriculture experts and consultants, and the multi-stakeholders boards consisted of private and public partners, but the project has not resulted in significant private investment. Another example of public-private partnerships is the Agri-skills project. For this project neither government nor private sector have taken a lead role and made significant investments.

²⁰⁶ Website: http://www.doingbusiness.org/data/exploreeconomies/uganda

c. FS policy and Dutch trade policy are coherent.

This hypothesis is partly supported. As described in detail, the programme of EKN integrates both economic cooperation and food security. In the food security programme much is being done to promote trade, while the economic cooperation also aims at enhancing investment in food value chains. On the other hand, a focus on commercially viable farmers might actually decrease the competitiveness of the most food insecure. Also, intraregional and international trade might reduce the ability of food insecure farmers to compete against international bottom prices.

d. PPP projects are demand driven.

This hypothesis is only partly supported. The programme did not include public-private partnership projects in the strict sense. However, several projects brought together private and public contributions. For Agri-skills a market study was conducted before the curriculum was developed to ensure the project aligned with demand. This was an explicit demand of the government partners to the wider youth skilling programme (a public-private effort) of which Agri-skills is part. For Operationalization of DSIP there was also demand from the MAAIF for a more focused and actionable policy framework.

e. Investment in the productive sector creates resources for social sectors.

There is no information from the programme and project documents to support this hypothesis.

f. The FS policy has positive effects on FS stability and global public goods.

This hypothesis is partly supported. ISSD for example promotes the banking of both bread and important seeds and local seed varieties, which creates a wide diversity of seeds which are not patented but widely available. Some projects have included elements that make farmers more resilient to climate change and at the same time reduce their ecological footprint, including the local water irrigation systems by CATALIST. This therefore contributes to FS stability. The effects on global public goods are less extensive.