

Brewing beer in the aftermath of Ebola

an anthropological case study on the development of a sorghum value chain



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Caption photo front page: F&J visiting demonstration plot, Blama 29 July 2016



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Abstract

Keywords: CSR, Contract Farming, outgrower schemes, smallholders, agricultural value chain, sorghum, Sierra Leone

This case study focuses on the CREATE project in Sierra Leone. A project where Sierra Leone Brewery Limited includes outgrowing farmers in its value chain to brew beverages. Critical academic studies on CF often conclude win-lose situations in disfavour of the farmers. Farmer organizations are named to potentially be a positive influence on the bargaining position of farmers. However, it seems so far little attention has been given to the background and positioning of FO members in CF schemes. This mixed methods study, including six months in the field, examines the room for manoeuvre that outgrowing farmers enjoy in a Contract Farming initiative that works through a farmer organization. An additional factor to the study is the fact that months prior to the fieldwork, Sierra Leone got declared Ebola free by the World Health Organization after the 2014-2015 epidemic. Therewith the study also presents information on the resilience the project's design provides to overcome a technical disaster. Though securing outgrowing farmers' sales should be given attention, the CREATE project provides a positive counterpart to critical academic literature: it provides a substantial income generating activity, which is mostly taking charge by women; through an infant crop; trying to adapt to existing farm practices.

Preface

This thesis is written with the chair group Disaster Studies within the master International Development Studies at Wageningen University. Disaster Studies may sound heavy. Basically it *“aims to understand how disasters and conflicts come about, how they affect people and how they transform societies”* (WUR, 2019). In developing countries, the effects of natural and technical disasters are often more extreme and have a larger impact on people’s lives. The 2014-2015 Ebola epidemic in Sierra Leone is an example of such a setting.

The CREATE project, of Sierra Leone Brewery Limited and the NGO EUCORD, re-launched quickly after Sierra Leone was declared Ebola free by the World Health Organization. This was half a year before my arrival to conduct fieldwork on the project. When entering the field, two things became clear: 1) Due to travel restrictions during the Ebola epidemic only few project activities were conducted during the epidemic. 2) Concrete baseline data on the project recipients barely existed. Therefore, at my time of arrival a certain zero measurement took place of the project.

List of Acronyms

CF	Contract Farming	
CREATE	Community Revenue Enhancement through Agricultural Technology Extension	
CSR	Corporate Social Responsibility	
EUCORD	European Cooperative for Rural Development	
FBO	Farmer Based Organization	
HDI	Human Development Index	
HYV	High Yield Variety	
MT	Metric ton	
NGO	Non-Governmental	Organization
SFA	Sorghum Farmer Association	
SLARI	Sierra Leone Agricultural Research Institute	
SLBL	Sierra Leone Brewery Limited	
SLL	Sierra Leonean Leone	
USD	United States Dollar	
VSL	Village Savings and Loans	
WASCD	West African Sorghum Value Chain Development	

(...) Deleted text from interview transcript to increase clarity

[] Text between block brackets is added or altered from the original transcript to increase clarity

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Chapter 1: Introduction

The activities of Multinational Enterprises (MNEs) in developing countries are debated. Both within the societal as the academic corner the role of MNEs in development countries are discussed. As MNEs try to optimise profit and minimise costs, for long they weren't perceived to have a development character. However, in recent years the development sector sees public-private partnerships as an interesting combination to create opportunities to the ones that are without. Besides, the contemporary Western consumer market expects of its Western MNEs to take up their Corporate Social Responsibility. Brand leading companies like HEINEKEN International who are in continues spotlight can ill afford brand damage. They incorporate activities to positively stimulate their environment in their aim to maximize profit (Rajak, 2011; Bondy et al, 2012).

One of the business designs by MNEs in developing countries that is praised by influential development institutions like the World Bank is Contract Farming. By vertically including outgrowing farmers into their value chain, MNEs introduce smallholder farmers in development countries to the formal market; potentially providing them a stable income source. CF initiatives usually aim for long term collaborations as it may take years to develop the supply chain (Felgenhauer and Wolter, 2008). Critical academic literature however, express the fear that CF initiatives lead by MNEs eventually lead to win – lose situations, in disfavour of the farmers. Farmers potentially run production risks by implementing unfamiliar farm techniques, become dependent on the buyer-processor for both farm inputs and income and lose food security by shifting away from important food crops (Kirsten and Sartorius, 2002; Oya, 2012).

HEINEKEN International however, got international recognition in 2010 for its CF initiative in Sierra Leone, winning a World Business and Development Award (Heineken, 2010). On a critical note in line with Bondy et al. (2012) it could be said that HEINEKEN Int. received this recognition by large corporations that took over the dominant discourse of CSR, seeking to demonstrate how consideration of social and environmental concerns can contribute to the financial position of business. It can thus still be questioned to what extent the Sierra Leone case favours farmers too. After the award, two journalistic works from Dutch soil focussed on HEINEKEN its activities in Sub Saharan Africa: the book 'Heineken in Afrika' in 2015 and the documentary 'Hollandse Handel' in 2016. Notably, both journalistic works had the CF project in Sierra Leone on their radar, put effort in it, but failed to show the audience information other than a couple of seconds screen time and one interview with an apparent participating farmer. Coincidentally both works appear not trying to minimize their personal bias, taking the angle of Western business being the 'bad guy' acting in developing countries.

As a master student in the Social Sciences, taught to try and minimize personal biases, I go into the HEINEKEN in Sierra Leone case study and explore what this awards winning project means for the receiving end of the initiative: the farmers. Remarkably to this case study is that the fieldwork started 6 months after Sierra Leone was declared Ebola free. It thus also

presents information on the resilience of the value chain to sustain two years of the Ebola epidemic and what this disaster meant for the farmers cooperating in the CF initiative.

This thesis is based on the extensive use of personally collected research data over the course of six months in the field, using a mixed methods approach. I analyze the data against the ongoing debate about Contract Farming. Some information is presented in an earlier written report.

Chapter 2: Contract Farming: design and dynamics

HEINEKEN International aims to incorporate subsistence farmers in their supply chain of brewing beer in Sierra Leone. It does so by so called Contract Farming (CF) which is a business design which is mostly criticized by critical academic literature for not establishing an equal business relationship between the initiating party (the buyer producer, in this case HEINEKEN) and the outgrowing farmers. This case study explores the opportunity for farmers by collaborating with the brewery in its CF initiative. The project is being studied from a CF perspective and therefore it is necessary to first establish an understanding of it. How is CF conceptualised in the literature, and how is CF evaluated?

What is contract farming?

Oya (2012) provides an easy conceptualisation of CF. Basically contract farming is a form of vertical integration between agricultural producers and buyers. Binding arrangements are made between the contracting buyer-processor and contractee, which in this case are Sierra Leone Brewery Limited and the nucleus farmers. By contracting individual or groups of farmers, the processor ensures its supply of agricultural products, in this case sorghum (Felgenhauer and Wolter, 2008).

The design of CF varies, however, strongly. The contract between the processor and the producer can specify several factors, like the price per quantity, quality standards of the produce, inputs provided by the processor like fertilizer and seeds, the processor providing credit facilities to the producer, packing requirements of the produce, plus ways and time of delivery. Contracts can also vary in the amount of control that the processor will exert on the production process (Little and Watts 1994 in Oya, 2012; Kirsten and Sartorius 2002: 508).

The amount of control the processor exerts can depend on the production standards that the producers need to meet. The processor's transaction costs are higher when the farmers are not familiar with the particular crop they are requested to produce (Chamberlain and Anseeuw, 2017). Depending on the personal level of expertise on the crop it wants to secure via vertical integration, the buyer-processor may decide to develop the outgrower scheme itself or to hire an external party specialized in agricultural supply chain development. Outsourcing to an external party usually happens when the buyer-processor has no expertise in agriculture and/or prefers to stick with its core business. Hiring an external intermediary party between farmers and the processor will most likely reduce transaction costs (Chamberlain and Anseeuw, 2017). In the case of this project, SLBL decided to involve the NGO EUCORD to take up this intermediary role. It can take several years before a CF design runs well. It is common for CF to need several years to develop itself into a well functioning supply chain.

Establishing a well functioning CF design can take several years. The buyer-producer may be new to the environment, farmers may be new to crops and/or production techniques and thus a whole new interface may need to be established to run efficient. Contract farming has

therefore the intention to establish a long-term cooperation (Chamberlain and Anseeuw, 2017).

In the time period of 1975-1985 contract farming appeared to make its way to the African continent, with around 60 schemes operating in 16 countries (Kirsten and Sartorius, 2002: 508). "Around this time period contract farming was seen as an interesting construction to uplift the agricultural performance in developing countries. Still, it is seen as an interesting method to include smallholder farmers in developing countries into the modern economy (Kirsten and Sartorius, 2002; Oya, 2012). The World Bank's report on agriculture in 2007 spends a great deal focussing on contract farming (OYA, 2012). Perceived pros for farmers in developing countries are as follows: CF provides the farmer with a readymade market and a fixed price, plus it is believed to be a potential means to introduce farmers to new farming technologies. This means that farmers have to spend less time marketing their produce, leaving them time for other activities. Furthermore, the buyer-processor may provide the farmer credit and input which might otherwise be difficult to get, for example: fertilizer, high yield variety or preferred seeds or irrigation pumps (Kirsten and Sartorius, 2002). This way CF can entail more than just the vertical integration of the producing and buying parties. Objectives can be included like increasing outgrowers' quality of livelihoods (Kirsten and Sartorius, 2002: 508).

Contract farming can thus be an interesting format to interlink with a company's Corporate Social Responsibility strategy (CSR). As to clarify the understanding of CSR in this thesis, the definition of Bondy and Starky is followed: "CSR can be understood as how firms integrate social, environmental and economic concerns into their 'values, culture, decision making, strategy and operations in a transparent and accountable manner and thereby establish better practices within the firm, create wealth and improve society' (Bondy and Starkey, 2014)." The local sourcing strategy can be seen as such, where business is intertwined with development goals like poverty alleviation.

Besides vertically integrating producers in the value chain, contract farming can be part of an agribusiness its political agenda. The agribusiness' involvement in a national development project might positively influence its political relations which can result in an economic gain through certain government intervention (Kirsten and Sartorius, 2002; Oya, 2012).

Within the CSR discourse it is sometimes questioned how sustainable the activities are that companies conduct as the CSR course can easily be changed as it is often not part of the company's core activities. CF intends to establish a long-term relationship. The chance seems therefore higher that a buyer-producer sticks to its developmental intentions. Still, an MNE with a profit mark will need to find a balance between profit maximization and its developmental goals. From an economic viewpoint it would make more sense to contract efficient and technologically sophisticated large-scale outgrowing farmers than a great number of smallholder farmers (Oya, 2012). You would reduce transaction costs and it is easier to achieve quality consistency (Kirsten and Sartorius, 2002). The question can be raised to what extent the CREATE project follows its targets aimed at improving farmers' livelihoods

besides its target of establishing a sustainable supply chain and increasing farmers' production level. This will be further discussed in chapter 4 (Blowfield, 2005).

Reasons to step into Contract Farming for the buyer-processor

There are several reasons why it can be interesting for the buyer-processor to get involved with CF. One factor is Land: working with plantations and land grabbing are criticized practices and risky undertakings in contemporary Africa. By working through CF the buyer producer has access to land via a favourable way in the eyes of governments and development institutions (Shepherd, 2013). It is still possible to maintain control over the production process of outgrowing farmers.

Through contract farming the buyer-processor ensures itself of getting the supply it requires for its own production process. Plus, via contractual agreements it can make sure that outgrowing farmers meet the production standards and possible certification requirements, like for example pesticide free production (Shepherd, 2013).

Challenges for the buyer-producer

Using Contract Farming as a business strategy does come with particular challenges for the buyer-processor. When a large number of spatially disperse group of farmers is involved, communication, knowledge transfer and the provision of inputs may be difficult and costly. This may have an effect on the product quality and delivery, as for example the quality standards may not have been clear to farmers. Extension workers may be necessary for the buyer-processor to monitor the activities. Not only to make sure that farmers cultivate according to the required production standards but also to prevent malpractices. Farmers may for example use inputs for other purposes or crops, like loans and fertilizer. It could also be that farmers sell their products to someone else. Within a weak legal system the buyer-producer may not be able to enforce contractual obligations. To reduce transaction costs and achieve greater consistency of quality and supply, buyer-processors can prefer to work with larger farms than hundreds of outgrowers. Further, the support of the political environment towards the private sector and the contract farming design may also influence its results (Kirsten and Sartorius, 2002; Shepherd, 2013).

Focussed on the outgrowing farmers

Contract farming also receives critique among the development sector its practitioners, economists and policy makers. The main critique is that, even though farmers maintain their own land and contract farming moves away from land grabbing and plantation practices, the processor-buyer basically still exploits the producers. Outgrowing farmers possibly have an unequal bargaining position towards the buyer-processor. The outgrowers' unequal bargaining position is mostly because contract farming in developing countries include many outgrowers that produce on a relatively small scale (half a hectare of land). Plus, the outgrowers risk becoming dependent on the buyer-producer for agricultural inputs, loans and income generation. This dependency can displace the farming decision making authority from

farmer to processor, basically making the farmers quasi-employees (Kirsten and Sartorius, 2002; Oya, 2012).

Besides their autonomy, farmers may also face increased production risks. This usually happens when farmers in developing countries change from traditional crops into non-traditional crop where technology has not been developed locally.

Besides farming risks, contract farming appears to increase levels of conflict within the farmer household, relating to the households' food security. When a farmer decides to change its farming strategy and starts focussing on the contract crop, his wife may get angry as the husband may stop the cultivation of preferred food crops, potentially decreasing the household's food security. Additionally, the price received through contract farming can be lower than the price on the local market. The reason for it is the trade off between a lower price with a readymade market versus a higher (or fluctuating) price at the local market where sales still have to take place (Kirsten and Sartorius, 2002; Shepherd, 2013).

As the CREATE project creates a new market for sorghum, it is good to question how familiar farmer households are with sorghum cultivation. How high are the chances of production failure? Plus, how extensively do involved farmers cultivate sorghum? Do they stop cultivating other preferred food crops as a result of the sorghum market? Also, do farmers change their farming strategy or style as a result of the project? The answers to these questions will most likely co-depend on the farmers' dependency on the market and the level of communication between the buyer producer and the outgrowing farmers.

Shepherd (2013) calls "trust" the most important word in contract farming for the outgrower scheme to be able to work effectively. "Contracts will only work when both parties believe they are better off by engaging in them and for this to happen there must be an understanding of each others' needs and problems. This requires a willingness to collaborate and share information (Shepherd, 2013)." However, working with thousands of outgrowing farmers all spread through the country, the buyer-producer is likely to work through a Farmer Outgrowers Association. Wherein the members represent the outgrowing farmers and can serve as the communicational link between the buyer and the producer. Thus, the establishment of "trust" relation between the buyer-processor and the producers, depends for a certain degree on the FOA members. What is known about FOAs?

Farmer Outgrowers Associations

A common plead and core recommendation of the World Bank to prevent a possible 'win-lose position' in disadvantage for the smallholder, is the creation of outgrowers' associations to enable to farmers to join forces and gain a collective bargaining position (Oya, 2012). The farming organization would serve as a bridge between the individual outgrowers and the processor (Isager et al, 2018). "The World Investment Reports (UNCTAD 2009, 2011) argue that farmers' organizations improve contract farming schemes by helping to strengthen the negotiating capacity of farmers, overcome information and communication deficiencies,

improve farmers' access to technologies and credit, minimize risk, make transnational corporations more environmentally and socially responsible, and reduce transaction costs.

In theory it is not only the outgrowers that can profit from organizing themselves to gain a stronger bargaining position. Also the buyer/processing agribusiness has an interest in a well-functioning farmers organization. Contracting out to small-scale farmers entails costs and risks for the buying agribusiness, especially when thousands of smallholder farmers cooperate in the outgrower scheme that are widely spread geographically. The outgrowers may need support with the production process. The processor might need to set up complex structures to be able to: communicate with the farmers, teach farmers production techniques, provide agricultural inputs, monitor production processes and transportation. A well functioning farmer association could be a link in the knowledge transfer of certain production demands and farm techniques (Kirsten and Sartorius, 2002). Also, farmer organizations may function as a way to overcome challenges related to side-selling of production to other buyers and farmers exiting the cooperation (Isager et al., 2018).

In practice, it appears difficult to say whether working through farmer organizations meets its promises on paper as little research has been done on the role of farmer organizations in CF (Shepherd, 2013). Isager et al. (2018) cast a somewhat realistic/pessimistic view, stating that the mainstream literature *"dwells on the illusion that 'producer organizations' in poor developing countries can possibly exert some influence through lobbying on price-setting mechanisms for the export crops that they produce."* Besides, who are the selected members within the farmer organization? When the buyer-producer is far removed from the outgrowers, the members of the FOA should decrease that gap. The selection criteria or process will co-decide whether that will be the case. As the case study of Isager et al. (2018) of a FOA in Tanzania shows, the farmer organization members take influential positions within the CF initiative. Taking up the role of mediators, they are able to keep business related information to themselves or use it mostly to their own interest and the interest of their closer related farmers. This could mean that a limited group of individuals profits from a CF project possibly intended to serve a big number of smallholder farmers. Whether the FOA members conduct other income generating activities may influence their focus on the CF project too and which may also influence the impact that smallholder farmers experience from the project. When the CF project isn't the main focus of the FOA member, the contracted person will likely be less worried about additional development targets of the CF project other than delivering quality produce to the buyer-processor.

In their CF review article, Kirsten and Sartorius (2002) state that to make the idea of cooperation with farmer organizations work, the farmers in a central position should be properly screened by the party developing the outgrower scheme, which is mostly the buyer-processor (CREATE). The writers do not elaborate on what this screening entails. Personally under 'screening' I understand the person's farming competences and aspirations, some business skills/background and preferably sharing a common language with the project its executives and his/her social and political position among the communities he will represent,

instruct and inform. These assumptions relate to the fact that the legal system of African developing countries is often weak (reference) and work relations are usually build on trust. Whether the contracted person is a stranger to the outgrowing farmers or part of the community could have an influence on the outgrower scheme's effectiveness.

It appears however that there are few successful experiences with farmer organizations' that support reaching a successful outgrower scheme (Gibbon and Ponte, 2005; Shepherd, 2013). As follows, Shepherd expresses the question what role should a farmer organization be given to increase the chance of a well functioning outgrower scheme? Should the contracts be established with organization members or should it just take up a supportive role in the communication between the buyer and the suppliers? This thesis will try to provide insight on the role of the nucleus farmers, who together form the FOA. The in 2013 launched CREATE project is still in development to reach a sustainable value chain. However already in 2010 the local sourcing project received international recognition by winning a WBD award (Heineken, 2010). They form the link between outgrowers and SLBL and so a logical assumption would be that these nucleus farmers have a positive influence on the project.

Problem statement

From the literature is learned that Corporate Social Responsibility became seen as a positive development where companies would take up a development role by teaming up with NGOs. However, the mainstream CSR discourse became at the hand of MNEs that aim to reach profit maximization, using CSR as a tool to reach it. Contract Farming can be such a strategy. International institutions like the World Bank encourage outgrower schemes as it provides African subsistence farmers a way to the market. Academics are however sceptical about the positive outcomes CF has to farmers, often resulting in a win-lose situation as farmers become semi-employees of the buyer-processor and dependent on the MNE for both inputs and income. To prevent win-lose situations from happening, a recommended strategy is to work with FOs, representing the outgrowing farmers interests. However, there appear to be few studies providing insight into the profiles of the actors included in FOs and how the FO functions in relation to the other project stakeholders. Shepherd (2013) concludes "the best method of operation is far from clear." Insight in the FO will possibly add important insight to the question what participation in CF implies in reality for outgrowing farmers. This thesis tries to provide insight in the space of manoeuvre that outgrowing farmers enjoy within a CF initiative by conducting a multiple stakeholder analysis where the buyer-processor works through an FO to reach outgrowing farmers.

Research question

To what extent does the CREATE project provide outgrowing farmers space to manoeuvre by working through nucleus farmers?

Sub-questions

- Which stakeholders are involved in the sorghum supply chain and how do they negotiate among each other?
- How dependent are farmers on the sorghum project for their income generation?

To be able to answer the main research question, it is required to perform a multi stakeholder analysis to know which actors are involved with the CF initiative and how they negotiate among each other.

To be able to answer these questions, there are certain factors that require contextual insights. Such are: Sierra Leone. Heineken working in Sierra Leone: in what market context does the brewery find itself? A question that provides context to decisions made by the brewery: the supply chain, the CREATE project during the Ebola epidemic, how did it get picked up after the Ebola.

Concepts and units of analysis

In order to study the room for manoeuvre for outgrowing farmers within the sorghum market, a multiple stakeholder analysis is conducted. The opportunities outgrowing farmers find within sorghum cultivation will have to do with the way the involved actors position themselves and relate to each other. Through several units of analysis I try to determine the positioning of the involved actors.

Demonstration plots: these are the main tool for knowledge transfer coming from the CREATE project. what are the introduced techniques by the CREATE project, how are these transferred onto the outgrowing farmers? How heavy does the buyer-processor SLBL rely on these particular practices to reach the required production quality?

Existing sorghum farming practices: Does the project fit into the existing farming styles of outgrowing farmers or does it require much adaption? To what extent do the introduced techniques differ from existing techniques and practices?

Sales: To what extent are outgrowing farmers' sales secured? Is there favouritism in play from the buying party, how does their buying strategy look like? How risky is the involvement in sorghum cultivation for the food security of the farmer household? This is officially the main development target of the CREATE project: increase food security of farmer households through income enhancement by sorghum sales.

Income: It are the nucleus farmers who have contracts with SLBL, even though the outgrowing farmers are the actual target group of the CREATE project. What do farmers earn by sorghum cultivation and how do they spent the income? Is the local market of any influence to the SLBL

sorghum supply chain? The gained income may provide some insight into the importance given to the project for the farmer household its development and food security.

Chapter 3: Methodology

This chapter elaborates on the methods applied to collect data that correspond to the units of analysis. I apply triangulation by using mixed methods and co-construction of knowledge. Subsequently, I share ethical considerations, limitations and reflections.

Mixed Methods

The aim of this study is to understand the implementation of the CREATE project through nucleus farmers to reach its target of improving food security among participating farmer households. In order to come to a rich understanding of the project, both quantitative and qualitative data are gathered (mixed methods). As Richards (2016) states “a model is only as good as the assumptions that go into it”, the assumptions forthcoming from the qualitative study can be checked with the quantitative survey. Vice versa, data coming from unstructured interviews, semi-structured interviews and participant observations can shed more light onto quantitative data outcomes. Qualitative research methods allow the researcher to touch upon questions that are unsuitable to adapt in a quantitative survey. Quantitative research through conducting questionnaires makes it able to collect and compare structured information provided by a large number of informants. Hence, the forthcoming data result in more valuable research outcomes.

Co-construction of knowledge through local research collaboration

Within co-construction of knowledge the emphasis on making the data gathering and analysis partly a collective endeavor. You involve those who have been active participants in the research process. As Hale (2001) states: “the principle is to move toward breaking down the rigid dichotomy between “they” the providers of raw data and “we” the analysts, giving “them” the opportunity to make sense of the data they have provided and to compare their conclusions with your own.” “People who ultimately are the sources of social science “data”, tend to provide much more and higher quality information when they feel they have an active stake in the research process. Collective participation of these research “subjects” in data collection and its interpretation inevitably enriches what we end up learning from the research.”

In an environment very different from my natural habitat, I am conscious of relying on others in order to collect rich research data. Rich in the sense that, through reflection and interaction with key informants and stakeholders, I become better able to understand and interpret common values, norms, interests and relationships in the context of project stakeholders. Behind most behavior hides a rationality. When certain behavior doesn’t make sense to me or when my person (white, young, English speaking male connected to the CREATE project gradually understanding Krio language better) isn’t fit to accumulate data in a certain context, I rely on others whom have a certain position, skill or knowledge package to help me: CREATE project staff members, field supervisor, enumerators and other key informants. As a result of

co-construction, the planning of the study, collection, interpretation and analysis of data is not solely my own.

Within this collaborative research I did select the stakeholders and collaborators based on my estimation of who seemed fit to cooperate with. *Most* stakeholders were working in academics or were schooled and/or teachers (project coordinator, agronomist, supervisor, four enumerators, three nucleus farmers).

Through collaboration and inclusion of visiting distant villages, I tried to prevent to fall into 'the project and person bias' as called by Barakat and Ellis (1996): A researcher is drawn to sites where contacts and information are readily available. These are inevitably sites that have been visited before and are maybe prepared to present the researcher with information they like the researcher to see. Also, by solely focusing on key informants - who speak a mutual language but are not necessarily most representative of a group – potentially interesting sites, people and information are left out of the research, leading to biased results.

Access to the field

In agreement between HEINEKEN and EUCORD I got stationed with the CREATE staff. The time spent in Sierra Leone lasts from July 2nd to December 28th 2016. The CREATE staff has an office on the SLBL compound in Freetown. My research activities took place in coordination with the chief executive officer of EUCORD. (Since the CREATE project took a standstill in 2014 and 2015, it was decided to extend the project from the initial end date of December 2016 to December 2019. After the re-launch of the project in November 2015 the project was interested to know the current state of the project at farmer level.)

Qualitative research

Six months of being in the field gave me the opportunity to take time and implement the approach of 'hanging out'. On the advice of WUR researchers I took the first two weeks to settle down, orientate and network. For example, I introduced myself and had meetings with members of the SLBL management that were related to the project. From day one the CREATE staff involved me in all sorts of practical situations and social atmospheres, plus every day there was an opportunity to have a long discussion and chats about the project and the Sierra Leone context. There were days I tagged along with the accountant driving through Freetown while he was arranging things at for example the bank or sending out invitations for an event. It resulted in me becoming more street wise: how to handle situations, who to contact, how to address people and the pace of negotiations.

Besides the brewery compound I resided in a rural village in the centre of Sierra Leone, called Yele. This was also the home village of the project agronomist where he maintained a demonstration plot and tested high yield varieties of sorghum. In Yele, I resided part of August, September and November. Here I could process and analyze data and spend time with the project agronomist. Within the environment he was most comfortable, he taught me about sorghum farming and we would discuss rural life in Sierra Leone and my gained insights during fieldwork. Furthermore, the absence of Westerners and grocery stores (i.e. an undertaking of

eight hours by motorcycle) taught me a great deal in becoming (rural) Sierra Leone savvy. These experiences improved the quality of fieldwork activities and the analysis of data.

Data collection methods

Semi-structured interviews were held with nucleus farmers at the end of July and during some follow ups in October. Also with some agents I would have semi-structured interviews. Unstructured interviews were mainly held with agents, lead farmers and chiefs. For me this meant that I kept some topics in mind I was interested in but let the flow of the interviews depend on the particular encounter and person's (political) position. Participant observations took place at CREATE project events. It is a method suitable for studying crowd behaviour (Drury and Stott, 2001). By 'being there' I gained knowledge and insights from the project context. These observations took place within the CREATE project office and several project related events, such as: a farmer outing day with nucleus farmers to evaluate potential high yield varieties of sorghum, the introduction of the 100% sorghum beer named 'Salone' at the SLBL compound with nucleus farmers invited, visiting SLARI sorghum trial plots and the anniversary of the sorghum farmer association.

Forms of data recording

Field notes: during semi-structured interviews with stakeholders I took notes during the interview. During unstructured interviews with agents and chiefs I found it important to establish a more personal relationship during the one time I visited the village. Most villages haven't met someone related to the sorghum project beyond the agent or nucleus farmer. Also, the more comfortable we became, the more likely it was to gain data otherwise unmentioned. During a moment on my own or in the car I would write notes or record memo's of the conversations. The latter also goes for notes on participant observations. No voice recordings were made during interviews because of two reasons: as I was connected to the project I didn't want interviewees to get certain ideas. Also, for an honest conversation you need to build trust. Within a high context culture, it is more difficult to gain trust as a Western stranger asking about your business operation related to a project I am related to. Any factor I could remove in order to gain trust, I did.

Approaching the time in Sierra Leone as cooperative research, moments of exchange with the supervisor, enumerators, project coordinator or agronomist took place in the car from place to place and joint reflection would take place either after the field or next day. As Hale (2001) expresses nicely, this enhanced the depth of information exchange, viewpoints and concerns.

Diary: Six months in the field is a long time. My composure, knowledge and positioning developed over time. The diary helps reflecting on and remembering social encounters and relational questions and to remember or develop insights.

Logbook: a practical tool to keep track of events placed in time. When, where, with whom and who did I interview? A logbook is helpful for reflection and follow ups with stakeholders.

Pictures: proved a useful tool to compare farms and sorghum varieties. Also, pictures were part of the logbook. On mutual consent we took a picture during or after interviews but also CREATE project events.

Fieldwork trip semi-structured interviews

“The first part of the qualitative study consisted of orientating conversations with CREATE and SLBL staff members in July. Thereafter a field study trip was undertaken from July 25 until August 2nd to conduct semi-structured interviews with 22 of the 32 nucleus farmers. The project accountant reached out to all nucleus farmers for a possible interview at the end of July. The interviewed nucleus farmers are active in 10 of the 11 participating districts, with the exception of Pujehun district. Interviews with the nucleus farmers aimed to generate insight in the impact of the CREATE project so far and contextual information on the mutual relations between project stakeholders (Van Aken, 2017).”

“Practical implementation of the field trip visiting nucleus farmers: the implementation team was formed together with CREATE project agronomist, accountant and driver. The 22 interviews were conducted in English, Krio and one in Mende with the support of a SLARI agronomist. The project agronomist and financial officer were of great support with their (practical) expertise, in depth knowledge and translations when interviews were conducted fully in Krio. On average interviews took 45 minutes each (Van Aken, 2017).”

“Information from the interviews contributed to the construction of both the farmer household survey and follow up interviews with nucleus farmers and their agents during the survey field trip. Furthermore, the field trip interviewing nucleus farmers served of great practical value to the implementation of the following farmer household survey in terms of: getting acquainted with them; geographical knowledge on Sierra Leone districts; becoming familiar with cultural customs and learning the Krio language. Without the qualitative pre-study to the farmer household survey the implementation of the survey wouldn't be possible in its accomplished form. (Van Aken, 2017).”

“During the implementation of the household survey several additional semi-structured and unstructured interviews and follow ups were held with nucleus farmers, agents, village chiefs and lead farmers. These conversations helped to construct additional perspective on local context, adding explanatory value to the data output from the household survey (Van Aken, 2017).”

Quantitative Study: Household survey

The farmer household survey has been conducted to gain knowledge on the livelihood situation of the participating farmer households and the impact they experience of participating in the supply chain. An 11-page questionnaire was conducted with sorghum farmers. Topics include food security, income, crop cultivation, costs, crop damages and support. The interviews were held at the farmers' villages. In total 235 farmer respondents were included in the survey from 6 different districts and villages. The survey implementation took 15 days, from 14 October until 28 October 2016 (Van Aken, 2017).

The term household is defined as ‘people who eat from the same pot and sleep under the same roof on a regular basis.’ This definition is based on previous surveys done in Sierra Leone (REDD, 2014). Five experienced enumerators confirm the application of this definition before we started conducting the survey (Van Aken, 2017).

District selection

The survey covered 6 of the 11 districts where sorghum is produced: Kenema, Kailahun, Bo, Kambia, Tonkolili and Moyamba (Appendix 1 shows a map of Sierra Leone’s districts). The reason to visit 6 districts is the ability to compare differences in performance between locations and with enough respondents included. For selecting the districts to carry out the survey there are two main factors taken into account, namely: 1) the number of farmers per district; and 2) the amount of sorghum supplied per district. Also, districts were selected from all three regions of Sierra Leone: North, East and South.

Per district the minimum target was to include four villages and to conduct six questionnaires per village, so 24 questionnaires per district. Also, to compare differences between farmers working with different nucleus farmers, respondents from two different nucleus farmers per district were included in the survey. Because Kailahun district covers 20 percent of all sorghum farmers participating in the project, the target for this district was double the number of villages (8) and questionnaires (48).

Adding up the minimum targets per district, the aim was to get a total of 168 filled in questionnaires. During the survey implementation the teams were able to conduct more questionnaires, hence the total number of respondents included in the survey is 235 (invalid questionnaires excluded) (Van Aken, 2017).

Table 1. Number of respondents per district

Region	District	Female	Male	Total respondents per district
South-East	Kailahun	30	38	68
South-East	Kenema	16	23	39
South	Bo	21	24	45
North	Kambia	17	15	32
North	Tonkolili	16	16	32
North	Moyamba	10	9	19
	Total respondents	110	125	235

(source: own survey)Village Selection

For selecting the villages the following characteristics were taken into account:

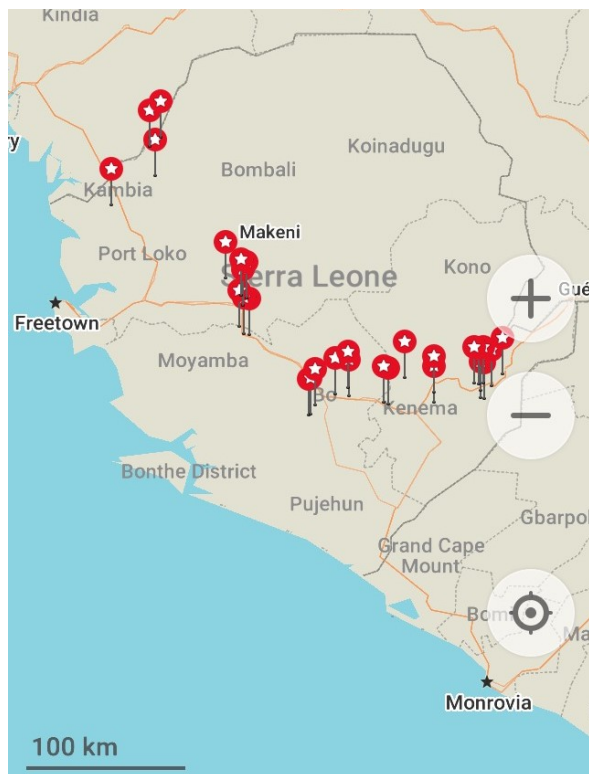
The nucleus farmer: The relationship with and the performance of the nucleus farmer is likely to influence the performance of the farmers. This is in terms of income, training, storage, transportation and extra support like food for work, medicine and tools. For the household survey the first criterion to select villages is that the nucleus farmer with whom the villages are working with, is based up-country. Communication on field with the nucleus farmer and their farmers will be better in comparison to the nucleus farmers who are based in Freetown. The second criterion is based upon perceived characteristics of the nucleus farmer, such as: farming themselves, generated yields, being a pure businessman, showing signs during the past interviews of taking more care of the farmers' health, etc.

The geographical location of the village: it is assumed that the geographical location of the village influences the impact of the project on the farmer. Villages that are closer to the highway or big towns/cities have several assumed advantages compared to distant villages: better marketing of their products, transportation and probability of receiving support from other institutions, e.g. access to agricultural inputs and loans. Because of the assumed geographical influence on the farmers' performance, the aim was to visit an equal number of more distant villages and villages located closer to the highway or big towns. By selecting distant villages I also tried to prevent the project bias. Meaning that researchers tend to be drawn towards sites where contacts and information are readily available (Barakat and Ellis, 1996). Distant villages are likely to not have received a visit by the CREATE project initiators.

The number of farmers in the village: only villages are selected with at least ten sorghum farmers. This is a precaution to make sure to reach the targets. If one of the respondents does not show up or is unavailable, the chance is increased that there will be another sorghum farmer available for an interview.

Male/female: Male and female farmers are picked 50/50 (Van Aken, 2017).

Picture 1. A geographical overview of the participating villages on the full Sierra Leone map



Gaining access and identifying gatekeepers

Selecting villages from the office beforehand appeared impossible. Road conditions continuously change, many villages carry the same name and are impossible to locate from distance. Basically you enter unknown territory and would get lost. Therefore, contact with the related nucleus farmers was necessary to get in touch with their agents who would provide us access. Together with the agent, I would decide on a schedule and the locations to visit. Preferably, the agent would contact the village in advance to make our visit known. Either the agent, a lead farmer or a chief would grant us final access. In coordination with an experienced and social enumerator who spoke the local language Temne or Mende, we the survey team would introduce ourselves, explain the reason of our visit and go through formalities and signs of hospitality.

Team selection and training

Every field day, a team of seven people was involved in the implementation of the survey: two field supervisors, including myself, four enumerators and a driver. With a team of seven the team fit in one car covering the big distances. Reasons to decide on bringing another supervisor were the supervisor's cultural and job expertise. In addition, it is important to be able to prevent enumerators from making errors or cheating. When teams split up to conduct the questionnaires in separate villages, one supervisor per team was available.

Because the dominant local language in the Northern districts differs from the one in the Southern and South East districts, two teams were selected and trained: one Mende speaking

team in the South and South East, and one Temne speaking team in the North. The additional field supervisor speaks both Temne and Mende.

The team covering the South and South East consists of experienced enumerators who have worked with Wageningen University research teams. The team covering the North consists of students from the University of Makeni studying at the development department. All have previous experience with conducting surveys. Both teams of four enumerators include two men and two women. For cultural reasons and to prevent bias on the data output the male enumerators interviewed the male farmers and the female enumerators interviewed the female farmers. When a husband of a female farmer wanted to be present during the interview of his wife, this was accepted¹. An indication note was given to the questionnaire paper (this happened twice).

Ethical considerations

- For the questionnaire, we tried to do interviews mornings and late afternoon for farmers not to travel back to the village while working on the farm f.e.
- We were careful to make no promises towards respondents or villagers.
- Enumerators interviewed farmers of the same sex.
- Explaining purpose of visit and informed consent².
- Taking everyone serious and be thoughtful (meta-data).
- I would not discuss Ebola time specifics directly with informants because of topic sensitiveness.

Data analysis

The units of analysis are as follows: positioning of stakeholders within the project, project related action and knowledge transformation, sorghum market and usage, impact of the Ebola epidemic on project stakeholders. Analysis of interviews is conducted through labelling of information. Data from the questionnaires are analyzed with the use of Microsoft Excel.

Limitations and Reflection

Farmers do not record their farm costs and revenues. It is therefore more difficult to get realistic figures of former years. To overcome this problem enumerators used distinctive events in a particular year to ask the farmer about information on a certain year. In the example of this survey, two factors that may assist farmers' memory are for example:

1. The strong fluctuation of quotas in 2013/2015 due to the Ebola outbreak;

¹ In line with Richards (1986) statement: within research we need to balance the need for knowledge with ethical considerations, i.e. do no harm with your activities. We wouldn't want to consider our benefits over potentially risking someone else's. As a researcher you want to minimise influence/impact to existing circumstances/context/ways (Goodhand, 2000).

² Barakat and Ellis (1996) Clarification of the researcher's agenda: this is important. Considering that respondents can judge whether it is safe or not to cooperate, plus it has been found that outlining the reasons for the study to those involved can be beneficial: when people are informed that their experiences may be used to help others in similar situations, they can be more willing to help.

2. The period of the Ebola outbreak serves as a timeline.

The perception of the respondent about the purpose of the visit influences the reliability of the survey³. Respondents may believe it could be in their interest to give answers diverging from the truth. The research team tried to remove any factors that could stimulate such line of thought, in terms of appearance, introduction and communication with the respondents and their community.

The practical necessity of including villages from nucleus farmers that reside up country may have left out data indicating differences in comparison to farmers residing in Freetown. However, three nucleus farmers included in the survey reside in Freetown or the bigger city Kenema and all show the implications of having long ties with the agent/villages. Still, I cannot make overgeneralizations based on such a small sample, though it offers a 'hint'. The data from this survey cannot be generalized for the districts that were not included in the survey.

Within the approach of co-constructing knowledge, I was aware that the collaborating members had partial knowledge and possibly non-neutral views. It required me to ask follow up questions or check whether for example the field supervisor wasn't elaborating on wrong assumptions. Also, it was important to understand how the collaborators were situated in relation to my activities and the research topic. This required me to constantly reflect and read situations among the collaborating members throughout my stay, plus keeping account of who provided information I noted down and took into further consideration.

Access to the field granted by EUCORD and HEINEKEN put me in an interesting position. It was difficult for some nucleus farmers and SLARI members to estimate/judge my position within the project and my level of influence. Although it was explained that I was performing a study on the project, in hindsight this must have raised some questions among them as most of them were already cooperating with the brewery/project for a couple of years. How could I perform research as an outsider, while I was teaming up with the CREATE project staff? After the first encounter I believed that the nucleus farmers observed that I had no other clear function other than seeing me observing and trying to understand the activities of the CREATE project. Sierra Leone being a 'high context culture'⁴, having the luxury of being able to take time, getting acquainted with social formalities and not rush with the fieldwork was a big advantage to gain trust in my perception.

³ Part of your identity has already been formed because of previous researchers or fellow countrymen/Western people (Brown, 2009). Additionally, as Von Stuckrad (2013) points out, you cannot escape certain identities. In rural Sierra Leone you cannot prevent that people will link you to 'aid and money'. Some images can be deceiving, but nonetheless people will perceive you as a certain someone because you fit to certain images.

⁴ Norman (2009): In low context cultures you might establish trust through contracts, signatures and written documentation. High context cultures on the other hand rely on verbal agreements and communal relationships. There are also the psychological and sociological approaches of trust to distinguish: the individual and rational elements, and the social and emotional elements.

Chapter 4: Context

This chapter provides a contextual understanding of farming and farming households in Sierra Leone. I go into the important food crops, relations like the division of labour within the farmer household and coping strategies to the 'lean season' and possible farm failures. Another topic that is given attention is the Ebola epidemic. The epidemic disrupted the country for about two years and started in the rural provinces. Six months previous to the start of my fieldwork Sierra Leone was declared Ebola free by the World Health Organization. The epidemic affected the CREATE project and the sorghum supply chain too. Its effect on the stakeholders may possibly show dynamics or provide insight into the way stakeholders have positioned themselves, which may give indications to the resilience of the CF initiative.

Country characteristics

"Sierra Leone is organized in 14 districts, divided over four regions: Northern: Bombali, Kambia, Koinadugu, Port Loko and Tonkolili; Eastern: Kailahun, Kenema and Kono; Southern: Bo, Bonthe, Moyamba and Pujehun; Western: Western Area Urban and Western Area Rural. The country has four distinct geographical regions: coastal mangroves in the West, the wooded hill country, upland plateau and mountains in the East. Sierra Leone has two different seasons, distinguished as dry season from December until May and rainy season from June until November (The World Factbook, 2017)."



Picture 2. Sierra Leone Districts.

Source: Mamasalone.wordpress.com (2015).

Since the country's independence in 1961 it experienced five military coups and a civil war between 1991 and 2002 (AED, 2009). After the war, Sierra Leone has held four successful democratic elections. Even though the country is rich in natural resources, it is one of the poorest and least developed countries in the world. On the Human Development Index, Sierra Leone belongs to the top 10 least developed countries, ranking 181 out of 187 countries in 2014. Its literacy rate is at 41 percent (UNDP2015a; UNDP 2015b). Since the country stabilized

after the ending of the war it experienced economic growth. However, the country depends heavily on international aid with around 50 percent of its public investments financed by international sources (UNDP, 2016).

With 62 percent of Sierra Leone's GDP, agricultural activities comprise the largest share (WB, 2015). Two-thirds of the population engages in subsistence agriculture (FAO 2014). 74% of the land area of Sierra Leone is suitable for cultivation. The average farm size is 0.5 to 2 hectares of land (AED, 2009). The country's staple food is rice, followed by cassava (Spring, 2015). Milled rice production makes up 85 percent of all cereal production and rice is grown on 88 percent of all cereal cropped land. Still, the rice production is insufficient to meet the country's demand. Rice makes up the majority of all agricultural imports (FAO/WFP 2014). For the year 2016 280MT milled rice has been imported by Sierra Leone, which is around 25% of total rice consumption 1100MT (IndexMundi, 2017). (Van Aken, 2017)"

Farming Techniques and Relations

As a guidance and example, the books of Paul Richards (1986) is being evaluated on dealing with the 'lean season'. Richards is considered as a great expert in the fields of rural / agricultural anthropology on West Africa, with a main focus on Sierra Leone. He has done research there for over thirty years and is both a professor (emeritus) at Wageningen University and Njala University (the agricultural university of Sierra Leone). In his book Richards does extensive ethnographic research on the village of Mogbuama, central Sierra Leone. Points of focus are farming techniques, social relations and coping strategies when facing challenges considering the farm. His observations are valuable to this research for two important reasons: 1) The activities of observation are focussed on rice farming, which suits this research well since sorghum appears to be cultivated together with rice. It will provide insight in the already existing activities and social division of labour where sorghum farming will be introduced to/coming in. 2) The coping strategies when households face challenges considering their farm (for example not enough labour at their disposal and low yields) provide some insight to what sort of challenges households may have faced during the Ebola epidemic and how they possibly dealt with them.

Division of labour: The household

Among the farming activities gender specialisation is not hard and fast, i.e. men and women will help each other out when necessary. While in routine gender specialisation of agricultural labour is an important aspect of current agricultural practice in Mogbuama, Richards found little direct evidence that the burdens fall disproportionately on women (and children) (an argument often made for other parts of Africa). His observation is that men and women work equally hard. Richards provides the explanation that in Sierra Leone men cannot permit themselves to lean on female labour. The amount of work that is demanded upon the household is simply too much to conduct them all on time.

There are however distinctions between particular male and female farm activities. The physical straining jobs of brushing the land and tree felling are the most exclusively male

preserves of all farming activities in Mogbuama. Male farming duties tend to be concentrated in the earlier part of the year. Afterwards generally the younger men go to cities to sell produce and hunt, while older men have time for court and politics. From June onwards women are working on the farms day in day out. Activities commonly exist out of weeding and taking care of mixed and side crops like groundnuts and cassava.

Non household labour

Many farmer households are low on resources and unable to pay for regular working parties to assist with the households' farm activities. Therefore, additional labour is mostly requested for the most vital and physical demanding tasks. This counts for preparing the land for planting by brushing and ploughing the plot and during harvest time. When the household is able to permit itself, additional labour is also called in for weeding and possibly fencing the plot against rodents. Payment takes place either in monetary payment or food for work (Richards, 1986)

Farm activities and social relations are interconnected

Richards (2016) clarifies how farming activities and social relations are interrelated through the example of the rice harvesting activities and the role that older, poorer and less strong women (and men) may fulfil. Rice harvesting is a labour demanding activity that extends over a period of time. Often food insecure women aid family members with the harvesting activities. As a reward they are rewarded an allowance of what they've harvested. Some women choose to sort off-types that are accidentally gathered into the bunches of rice that are waiting to be threshed. This is sometimes a necessary task for the household to be done, since off-types may be harder to clean than the main variety. The women may also choose to glean the recently harvested field and keep any interesting off-types still ripening. Not only for their food security are these off-types interesting to select, but also when people of this particular social group desire to farm themselves. Since they don't have the strength or (financial) capacity to fell the bush themselves, they rely on borrowing land from relatives that has already been cleared and cultivated before. Even though the potential plot is lower in soil fertility, robust rice off-types may still perform well on it.

The example shows how farm techniques (panicle harvesting and manual threshing), social organization and food security outcomes are co-produced. The social value is opening up spaces for widows to live independently within the quarter of the kin-group residential quarter.

It appears to be a particularly distributed social event and to me it illustrates Van der Ploeg (2012) his argument that a farming style is not just the way a farmer works. Subsistence farming is a way of life where work and the social environment are interconnected. Additionally, the farmer household is continuously finding ways for improving its efficiency and balance between drudgery and utility wherein everything and everyone is included to aim for improving its livelihood. This would also imply that any form of project intervention will likely request a change not only in farming technology but also restructuring the way social

relations are giving form. Which could also mean that preaching against certain techniques or cultural practices more generally is potentially counterproductive. The risk exists of failing to take into account the larger social field within which these events are embedded.

Man/woman farm income generation

Besides the sales of rice surpluses on the market, there are other income generating crops. Richards estimates these intercrops are as valuable for the household income as rice. The income from rice, the most important crop in terms of food security and income generation, belongs to the men. The income from intercrops generally belongs to the women. Therefore, any switch in agricultural emphasis probably impacts the income of women. For example, to switch from upland rice cultivation to swamp cultivation would mean the focus becomes solely on rice farming and women would lose their source of income through cultivating intercrops. In Paul his research published in 1986 of the people in Mogbuama, women earn about 40% of the household income.

This raises the question what sorghum cultivation will mean for the outlay of the farm and income division. Also, Richards notes that some men have stated somewhat jokingly that if the prices of sesame seed and egusi would rise, the income from these crops may have to be renegotiated.

Production differences per farm

This paragraph provides insight in the possible big difference of yields generated by farmer households. The CREATE project studied in this thesis provides farmers new practices that, in theory, will lead to increased yields. However, Richards observations below, show that lack of knowledge, resources and timing of activities can seriously impact yields even among existing farm practices.

Among the subsistence farmers, Richards (1986) found large differences in production rates. On one soil type the five best farms produced 88% more rice per bushel of seed planted than the poorest five (of a total number of 17 farms). On a different soil type the five best farms produced 95% more rice per bushel than the poorest five farms (of a total number of 14 farms). These differences can be the result of several challenges: A farmer household may simply be too poor to hire additional labourers to be able to fulfil all necessary tasks. It could also be that in a particular year a household faces hospital bills that disable them to pay for additional labour. Also, tiredness or sickness can result in skipping activities that are necessary to acquire high yields. Activities like weeding, fencing against rodents or scaring birds might fall away. The number of household members at disposal to work on the farm co-determines whether a household is able to fulfil all activities. Having less family members at your disposal to work means more labour is requested from less people. Richards (1986) states that “*small scale producers are quite tightly constrained by labour shortages. Especially seasonal labour bottlenecks.*” Farmers are therefore sceptical of making a transition to labour intensive methods of rice cultivation (Richards, 1986).

Farm failures can also exist because of bad judgement or poor knowledge. This could possibly happen when a farmer makes a new farm site onto a different soil type. The time of broadcasting and the amounts of seed used can differ for good yields. In Richards (1986) study, timing was however stressed most by farmers as success and fail factor. A farmer requires skill, labour capacity and knowledge of when to commit resources. Richards observed that there were two or three impoverished farmers who eventually had good farm results and some farms that were expected to have good results did pretty bad. *“So although poverty and debt makes farms more vulnerable to failure, failure is by no means predetermined in such conditions (Richards, 1986, pg113).”*

Concerning the introduction of new farm techniques, which requires the farmer to make adapt his/her farming style, Richards states that *as a general rule, resource poor farmers have little if any scope for anything other than phased integration of new method”* (p.148). The existing farming style provides farmers with a flexible work style concerning the range of crops they could cultivate and the moment that farm activities require the households’ attention. Richards predicts it is unlikely that these farmers will abandon their current farming style for an untried alternative, especially when it concerns sole cropping. Therefore, Richards recommends that for newly introduced farm methods to succeed, they are tried on experimental basis, which replace certain components in the existing farming style.

The Hungry Season

Commonly, when farmers in Sierra Leone state that they suffer from the ‘hungry season’ it means that their households are short of rice and perhaps palm oil. Since 74 percent of Sierra Leone soil is suitable for cultivation, it is rare for farmers to be completely short of foods. In Sierra Leone farmers could cultivate crops all year through and could fish or hunt for bush meat (Richards, 1986).

The hungry season coincides with the later stage of the rainy season, lasting from around September until November. In the months October/November rice is harvested, providing farmers again with sufficient foods. In Richards study, most farmers are vulnerable to pre-rice harvest hunger. However, there are few years where all farmers are affected simultaneously. The one year, one farmer does better than the other, which could change the next year. Richards concludes that hunger is a direct outcome of the failure of a household’s farm. Notable is that the *“most common causes found are early rainfall, sickness or misjudgement of micro-political character”* (Richards, 1986, p.116). Households that are more vulnerable to possible hunger are households short of labour. These are normally smaller households, households that cannot find the resources to mobilise non-households work groups and households containing older people who can perform less heavy duties.

To be able to carry on through the hungry season, the most common safety net for households is to borrow rice from a community member and repay after the next harvest. In Sierra Leone the route to survival lies in patronage (which will be discussed in the next paragraph).

Patronage

Besides selling surplus rice on the market, farmers use rice as a means of handing out loans to others. This way the farmer is able to build or strengthen his/her position and network of patron-client relationships. It serves as a way of politics and it is seen as a security system for when a farm falls subject to bad yields. Most farmers have the chance to face bad yields at a particular year. A farmer who takes a loan the one year, can be the one who will provide a loan the other year. Therefore, the patronage system isn't seen as exploitative among its users as it addresses local concerns (Richards, 1986). I would say rice loans could possibly serve as a way for the lender to invest in external labour too as it may enable the farmer to provide the labourers food for work, what otherwise may not be able possible because of personal food shortages. Richards also argues that these local credit arrangements may provide a safety net that enables farmers to experiment with farm practices to a certain extend. For a CF initiative that requires farmers to make adaptations to their existing farming style or suggest new techniques, the patronage system may indeed support a farmer to experiment within calculated safety margins.

Richards argues that providing credit to farmers may be an alternative for farmers to the patronage system. It would free farmers to respond more effectively to market signals. The farmer could play into higher prices and make an income to be able to make further investments into the household.

Most surplus rice fails to reach the open market despite high prices because people are more concerned to use rice loans to build up or strengthen their networks of patron-client relations instead of making a profit in straight financial terms.

Ebola epidemic

In 2014 and 2015 Sierra Leone was one of the three Upper West-African countries hit by the Ebola outbreak. A deadly virus that spread among humans through contact with body fluids (i.e. semen, spit, blood, sweat, puke) of a virus carrier. In total 3590 people lost their lives to the epidemic in Sierra Leone. The first reports of the Ebola outbreak came in April 2014 from the Eastern district Kailahun. Through travels from the sick seeking care from traditional medicinal healers and family members, the disease travelled through districts Kenema and Moyamba to the capital city Freetown (Richards, 2016). Several measures were taken on a national level to prevent the virus from spreading, such as: travel restrictions and check-points, prohibition of public gatherings such as weddings and funerals and also schools, market places and bars were closed (Risso-Gill and Finnegan 2015). Also, international trade activities declined concerning shipping, intentional flights and closing of boarders. Expats and international NGO workers were evacuated, plus more wealthy citizens left the country. New cases declined when (local) response teams and communities knew how to take care for the sick by ways of quarantine and adapting burial processes (Richards, 2016). Sierra Leone was first declared Ebola free in November 2015, but after a new case at the beginning of 2016 the World Health Organization officially declared the country Ebola free in March 2016 (WHO, 2016).

The fieldwork of this report started four months after the World Health Organization declared Sierra Leone Ebola free (Van Aken, 2017). The epidemic affected economic activities and food security. Markets closed and traders didn't travel through remote villages. Within the formal sector restaurants, food and drinks sector have suffered most from measures taken to stop the epidemic. This has shown in sales, demand, new projects and firing employees (Bowles, 2015). Also the agricultural sector felt the impact.

Food security: research of HPN published in June 2015 shows that regions hit by Ebola started to experience an increased level of food insecurity. Also the research states that the regions where the epidemic ceased, food insecurity prolonged/continued to exist. Expressed reasons for food insecurity:

1) Some farmers were prohibited or afraid to go and work on their farms because of perceived possibility of contamination. 2) high price of import rice. 3) communities affected by Ebola had less people to work on the farms, affecting the output (FAO, 2014) It must be noted that increased food insecurity wasn't only to blame the effects of the epidemic. Continuing rains in November affects the production rate of farm fields, which added to existing food insecurity in the region. Glennerster and Suri found that the number of traders selling food items dropped. Their study published in November 2014 states that in Kailahun and Kenema (the first hit districts), there were 69% fewer domestic rice traders than 2012. In newly cordoned areas there are 29% fewer domestic rice traders. The onset of the rice harvest is normally accompanied by a large increase in the number of traders but this not the case in 2014. In all but the non-cordon areas the researchers observe a fall in the number of rice traders between September and October. The decline in the number of traders is concerning as informal traders travelling from farm to farm are the main way that farmers sell their crop. If traders are sharply reducing their activity because of fear of infection farmers will see a reduction in income and it will be hard for rice to move from surplus areas to deficit areas. While only a relatively small proportion of farmers sell rice (roughly 80% of the respondents in the AHTS data from 2010 kept their entire rice crop for their own consumption), other crops such as cocoa and vegetables have much higher rates of trade and are an important source of income for farmers in some areas (Glennister and Suri, 2014)

Further, the market price for imported rice appeared to have sharply increased in several regions such as Moyamba, Kailahun and Kenema. The document published in December 2014 by European Commission observes a 51% increase at Moyamba. The cause is probably due to the fact that Moyamba junction serves as an important market for the area and was shut down for 21 days because of quarantine (European Commission, 2014).

In summary

Lack of knowledge, resources, number of household members available for farm work and timing of activities can seriously impact yields even among existing farm practices. With new farm practices that may be introduced by a CF initiative, I therefore assume that farmer households therefore may risk low production numbers when not properly aided to new farm practices. Shortage of labour is an important factor that holds farmers back to incorporate

labour intensive farm techniques. The flexibility of the contemporary farm style concerning the range of possible crops and the time of harvest and weeding is to the liking of farmers as it provides a kind of time buffer. Namely, when faced hardship and the farm is given less attention, production is not completely lost. However, Van der Ploeg (2012) states that farmer households continuously try to find ways for improving its efficiency and a balance between drudgery and utility, i.e. improving their livelihoods. Outgrowing farmers may give newly introduced techniques a chance provided they find a safe way to experiment. A CF initiative will most likely imply that outgrowing farmers need to adapt their farming style. From the above information I would say that the approach of the buyer-producer will co-depend to what extent the farmer household experiences room to manoeuvre and figure out how to adapt their farming style. That on itself may decide how many farmers are willing to cooperate within the CF initiative. Risks because of increased dependency on the buyer-producer and necessary changes of techniques may put pressure on the social relations too. As the example of Richards (1986) shows, the contemporary rice farming practice creates a solution to the food security of older family members. Also, changing from mixed to sole cropping may result in the loss of women finding income generation, as they found through mixed crops. Thus, farming rearrangements may include rearrangements of the social sphere, which can also be considered as part of taking a risk for farmer households.

The patronage system may however function as a security system that makes farmers willing to experiment to a certain degree with newly introduced farm techniques. When facing failure, community members could aid the farmer by providing a rice loan. However, it may also trap farmers in the vicious cycle of debt and hunger. The CF initiative's design and practice considering credit availability to farmers may interest farmers to cooperate, as credit is difficult to get by for subsistence farmers. The proficiency of outside credit could be a potential way to break the poverty cycle.

The question rises what the impact of the Ebola epidemic was on the project's sorghum farmer households since food production decreased and the number of domestic rice traders dropped. Furthermore, with the food and drinks sector badly hit, the sorghum supply chain will have come under pressure as SLBL processes sorghum into its beverages.

Chapter 5: HEINEKEN International in Sierra Leone & the CREATE project

This chapter provides the context to which the Contract Farming initiative is analyzed. It starts with HEINEKEN its presence in Sierra Leone, followed by information on the CREATE project: what are its goals, how does the value chain function and what are the roles of the different stakeholders involved. After an overall understanding of the value chain is established, I go into the impact of the Ebola epidemic mostly on SLBL and the CREATE staff. Subsequently, before the study dives into fieldwork data analysis, I present information on sorghum and its position among Sierra Leone households in general. Lastly, I provide baseline data on farmers' production, income generation and costs: the current progress of the project provides the backdrop to which the positioning and relations of stakeholders are analyzed in chapter six.

HEINEKEN International in Sierra Leone

Sierra Leone Brewery Limited (SLBL) is part of HEINEKEN International. In the brewing world, SLBL is a rather small brewery. The company sells around 110.000 hectolitres of drinks annually with a revenue of 9.383.441 euro's in 2011.⁵ Around 130 people are under company contract. SLBL only serves the local market of Sierra Leone. The locally produced brands are Star (lager), Mutzig (lager), King Leone (lager), Guinness (stout) and Maltina (malt drink). The Heineken beer is being imported (Apotheker, 2012; AD, 2014).

In 1962 HEINEKEN International established the one existing beer brewery in the country of Sierra Leone until today, Sierra Leone Brewery Limited (SLBL). During the rebel war that lasted over a decade from 1991 until 2002 the brewery became occupied by rebel forces and the brewery was functionally destroyed. After the war, HEINEKEN Int. decided to rebuild the brewery site. In 2005 president Kabbah of Sierra Leone asked HEINEKEN its then regional president Tom de Man whether it was possible to include local farmers in the brewery's supply chain. The post-war era could use an economic stimulating boost. This request suited the idea of moving towards local sourcing of raw materials. Before the war, Heineken imported its raw materials to Sierra Leone. Within the company's 'Brewing a Better Future' concept, HEINEKEN Int. set the target to local source 60% of its raw materials in 2020. Within the program, SLBL exerts a role (Apotheker, 2012; Heineken, 2010).

Local sourcing

Like the CSR literature describes, the incentives for local sourcing are twofold: economic and social impact. For SLBL it is interesting to commit to local farmers for sorghum as it is cheaper, the price is more stable and you don't face the import costs of barley. CSR wise, by committing

⁵ This is an estimated 2,1 litres of beer per person per year. Comparing Rwanda to Sierra Leone, a similar sized country, in Rwanda the MNE produces 10 times more. With people drinking 10 litres per person in comparison to 2,1 litres of beer per person per year (Van Beemen, 2015).

to sorghum farmers, the brewery delivers an income opportunity to contribute to the local economic development.

Marketing wise this is also an interesting step, since the knowledge of local employment may increase the popularity of SLBLs beverages. It sounds like the classic win-win-win strategy for politics, company and the citizens. Internationally, the local sourcing project has received positive feedback, as a press release by HEINEKEN in 2010 exemplifies: *“during the Millennium Development Goals (MDG) Summit hosted by the United Nations, Heineken received the 2010 World Business and Development (WBD) Award for its groundbreaking sustainable local supply chain initiative in Sierra Leone”* (Heineken, 2010; Apotheker, 2012).

The CREATE project

In 2013 SLBL and the NGO EUCORD (European Cooperative for Rural Development) launched the CREATE project.⁶ From the cooperative its perspective, the development initiative aims to i) increase food security; and ii) improve livelihoods of sorghum producers in Sierra Leone. To realize these goals, activities are implemented to i) increase the agricultural production capacity of rural households; and ii) limit the dependency on imported commodities (reference).

There are four different sub-topics to distinguish through which the CREATE project tries to reach its targets of increasing food security; and improving livelihoods of sorghum producers in Sierra Leone.

Increasing farmers agricultural knowledge. This can result in higher yields, prevention of failure and increasing food security.

- Income. With the income raised by cultivating sorghum, farmer households can better serve themselves in primary life necessities, like: food security, paying for hospital treatments, education of children.
- Female empowerment by involving women in the economic activity of sorghum cultivation.
- Multi level stakeholder cooperation. By sharing knowledge and working together the value chain increases its success rate to reach production numbers.

The CREATE project is an extension of a previous project called WASCD (West African Sorghum Value Chain Development). CREATE its predecessor project was established in 2006 by HEINEKEN and EUCORD. The initial aim of the project was to create a new source of income for smallholder farmers through sorghum cultivation, like requested by former president of Sierra Leone mister Kabbah. SLBL would use sorghum as a substitute for malted barley to produce some of its beverages. In 2013, the CREATE project was initiated to build on the first

⁶ CREATE is an abbreviation for: Community Revenue Enhancement through Agricultural Technology Extension. Very likely, though not necessarily, the name CREATE was established before its explanation. In Sierra Leone it is a common playful game to make up acronyms to names or brands. Among SLBL employees every beer brand has received an acronym too.

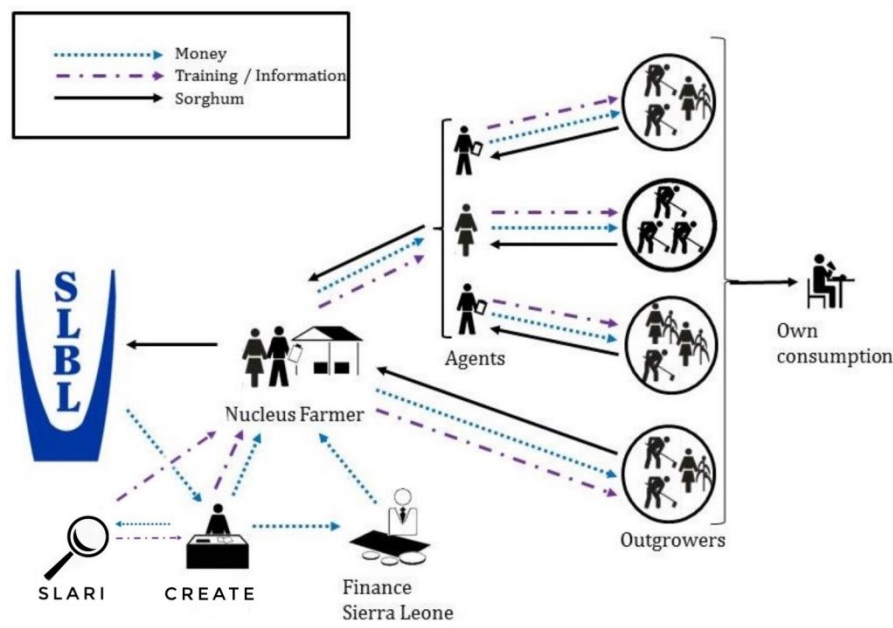
project by developing a sustainable sorghum supply chain, meant for long term business. Initially, the CREATE project was planned to take place from 2013 until the end of 2016. Unfortunately, the Ebola outbreak meant minimal activity in 2014 and 2015. As an effect of the Ebola outbreak it was decided among the project's stakeholders to continue with the CREATE project until December 2019 (Deters, 2011).

The Stakeholders Involved

Besides HEINEKEN, SLBL and EUCORD there are several other stakeholders to the project. In order to develop a clear picture of the project its structure, the remaining stakeholders are shortly introduced below.

source: Updated version of Apotheker (2010)

Figure 1: sorghum supply chain



SLBL

The brewery considers the nucleus and outgrowing farmers as independent business partners. The CF initiative is meant to local source SLBLs raw materials. Like the slogan of their cooperating partner EUCORD states: “bringing market lead solutions to the rural poor (EUCORD, 2019).” This is what the brewery does by initiating the sorghum supply chain. The main goal is to establish a sustainable supply chain that is able to operate well without further necessary involvement of a third party like EUCORD, when the CREATE project ends after 2019.

The CREATE project staff

The project staff fall under EUCORD. The team executing the projects activities contains a project coordinator, accountant, agronomist and driver. The coordinator of the project both has a position at SLBL within the supply chain management and with EUCORD. Having a background in agronomy and beer brewing is considered an important asset for the

coordinator's position to bridge or decrease any knowledge gap between SLBL and EUCORD. The project agronomist provides field training and monitoring.

The Dutch Ministry of Foreign Affairs

The CREATE project fits the profile of the Dutch Ministry of Foreign Affairs its 'aid & trade' policy. The ministry aims to stimulate public-private partnerships in developing countries (Vice Versa, 2017a; Vice Versa, 2017b). The CREATE project is funded by HEINEKEN International N.V. and the Netherlands Ministry of Foreign Affairs. The ministry being financier of the project, there development goals of the CREATE project are shared formulated goals, as long as the project runs. Taking this into consideration, what room does it create for the different actors? Now the project has the aim to reach 10,000 farmer households cooperating in the sorghum supply chain. As developing a CF scheme is a long-term matter and the project runs from 2005 until 2019, the farmers have the chance to establish quality production wherewith SLBL wants to continue cooperating instead of looking for other options like bigger farm companies.

Sierra Leone Agricultural Research Institute (SLARI)

SLARI is Sierra Leone's principal agricultural research institute, under the Ministry of Agriculture. Under assignment of the CREATE project, SLARI provides technical training to farmers during pre-planting, pre-harvesting and the establishment of demonstration plots. Besides, SLARI is testing several sorghum varieties. The goal is to find a high yield variety suitable to the conditions of Sierra Leone (EUCORD, 2016).

Finance Salone

Finance Salone is a microfinance institution in Sierra Leone that provides loans to the nucleus farmers to enable them to exert their activities. Many nucleus farmers cannot financially carry the investment of buying sorghum. A cooperation with Finance Salone that is willing to provide the farmers with loans, offers a solution. In the recent past however, not all nucleus farmers were able to pay back their loans. The recently added project coordinator found out that some of the nucleus farmers used the loans for other practices like mining activities (unstructured interview, 14-07-2016). As a result, Finance Salone stopped providing loans until all loans were paid back. This meant for some nucleus farmers that they weren't able to deliver sorghum to SLBL in 2015 (EUCORD, 2016).

Since contracts run between SLBL and nucleus farmers, the malpractice of some nucleus farmers indicates the dependency position of outgrowing farmers, as the latter group relies on the nucleus farmers for marketing the production of outgrowers. As a response to the 'loan incident', EUCORD and SLBL decided to start a business in 2017 course for the nucleus farmers to improve their financial management capabilities.

Nucleus farmers

The nucleus farmers are traders who buy the sorghum from smallholder farmers. Each nucleus farmer serves a certain regional area of villages. The nucleus farmers select the participating outgrowing farmers. All farmers are registered as members of the Sorghum Farmers

Association. However, the nucleus farmers represent them within this organization. At the time of starting this research, there were 32(?) nucleus farmers under contract with SLBL. The nucleus farmers make sure the quality of the produce is of the right standard; and transport the sorghum to SLBL. Concerning farm activities, the nucleus farmers are the main business partners of Sierra Leone Brewery Ltd within the sorghum supply chain. Additionally, the CREATE project targets to improve food security and farmer households' livelihoods run via the nucleus farmers. The nucleus farmers therefore play a key role in creating a sustainable value chain.

Most nucleus farmers work together with agents, who often serve as lead farmers too. The agents monitor the cultivation process of sorghum and assist the nucleus farmer in the buying and drying process. Concerning knowledge transfer from the CREATE project onto outgrowing farmers, nucleus farmers are expected to bring at least two agents/lead farmers to project training sessions.

Outgrowing farmers

The above mentioned stakeholders all have formal agreements within the value chain. The outgrowing farmers do not. Like it is common within CF schemes, SLBL choose to contract members of the Farmers Organizations rather than contracting each single farmer. The geographical spreading and the large number of outgrowing farmers would be practically undoable if the aim is to include subsistence farmers in the value chain. When I arrived in Sierra Leone, it appeared that SLBL and the CREATE staff had minimal knowledge on who the outgrowing farmers are. In conversation with an SLBL manager related to the project, he told me he would be happy if I could provide information on "who these farmers are and what this sorghum market does for these farmers (Semi-structured interview, 15-07-2016)". The lack of baseline data made me conduct it by myself and results mostly to insights, indications and hypotheses that may serve as leads to perform further research.

The supply chain in short

For sowing the land, sorghum farmers either use self-stored sorghum cultivated from the previous season or get it provided by the nucleus farmer. Farming activities go mostly together with rice cultivation. Rice and sorghum are broadcasted together on the farmland. Up until harvesting, farm activities will go together with rice farming (which is harvested earlier). The following activities are required by the smallholder farmer: land clearing, planting, fencing, weeding, harvesting, threshing, winnowing, drying, bagging, temporary storage and possibly leasing farmland. The bagging of sorghum proves to include its challenges. The majority of sorghum appears to be bagged in used rice or sugar bags. This means the bags are different in size and quality. Because of this, SLBL faces storage difficulties, as bags tend to be damaged and not of equal size. Also at the SLBL storage place some bags get damaged, resulting in some losses.

Harvesting of sorghum starts at the end of December and continues until March. Nucleus farmers will buy the sorghum from farmers, through their agents. On average, nucleus farmers

have 3 to 5 agents working for them. The unhardened roads to reach the farmer villages can be difficult to drive, because of ditches, water pools, narrowness and mud. Depending on village accessibility, this can cost the nucleus farmer extra transportation costs as the transporter faces an increased risk of damage. After the sorghum is bought, the agents and nucleus farmers collect, clean and dry the sorghum at a storage facility to meet the required quality standards by SLBL. The nucleus farmers are forced to dry sorghum too, since outgrowers use traditional ways to check the sorghum on its quality which are not meeting SLBL's standard. When the sorghum is ready, the CREATE office is contacted and an agronomist will check whether the sorghum meets the required moisture level. When it is approved, the nucleus farmer organizes transportation to the brewery. At the brewery compound, the sorghum is checked on its quality through five samples taken from the bags.

The project activities

Project field activities are in coordination with the nucleus farmers. Annual activities are: pre-harvest training in May, post-harvest training in November, moist control of sorghum before transport to SLBL and monitoring of the demonstration plots.

Basically all field activities run through the nucleus farmers. They are expected to be present at training days and select two lead farmers to bring along who seem competent to transfer skills and knowledge upon their farm groups and communities.

Pre-planting training provides farmers insights on planting techniques at the site of the demonstration plot, including: how to make straight rows for crops, the distance between the crops, ridging and thinning (both uncommon practices while broadcasting) and how much seeds to apply.

Pre-harvesting training shows methods of checking whether the sorghum is ripe and dry and how to store the sorghum to keep it dry and prevent contamination of other goods like palm oil and rice.

Moist control of sorghum is a security measurement to preserve the quality of sorghum. It is checked whether the dried sorghum falls within the moisture range required by SLBL to be able to purchase the sorghum. The moist control thus takes place at the storage site of the nucleus farmer right before it is transported to the brewery.

The demonstration plots are meant to educate farmer best practices introduced by the CREATE project. These best practices are focused around line cropping of sorghum instead of broadcasting. The demonstration plot is divided into three sections: line cropping of sorghum, line cropping of sorghum mixed with rice and broadcasting sorghum with rice. The purpose of these three sections is to show the farmers the difference in work effort and yield. This way the farmer can experience and compare the different practices closely, after which the farmer can decide on the preferred farm method. Every nucleus farmer is required to establish a demonstration plot. The nucleus farmer selects a possible site for the demonstration plot, after which the CREATE project agronomist needs to give his approval.

The CREATE project annual report of 2015 reports on the demonstration plots that most outgrowing farmers do not copy newly introduced farm techniques shown on the demonstration plots. The purpose of the demonstration plot is to generate best farm practices that are adaptable to the farmers' fields. To replicate the result of when an outgrowing farmer would implement best practices, the project recommends that nucleus farmers who farm themselves and otherwise one of their farmers establishes the demonstration plot. As they farm under same conditions and share a similar background on farm techniques. The annual report also suggests the possibility of increasing the amount of demonstration plots. Doing this would increase the number of farmers that are able to visit a demonstration plot (EUCORD, 2016). Apparently, so far the demonstration plots haven't shown their effectiveness. What are possible reasons? When did the project start implementing demonstration plots? In Chapter 6 I try to provide answers to these questions through fieldwork data on the interrelations and positioning of the several farmer categories.

Impact of Ebola on the project

As bars closed and gatherings were prohibited, SLBL's activities were hit. Sales of beverages declined and thus the demand for sorghum too. Since SLBL is the sole buyer of sorghum, farmers are at a loss when the brewery doesn't buy their produce. The Ebola epidemic shows the risk of one buyer. In an attempt to show its commitment to the project farmers, SLBL sent out sorghum quota to farmers. The CREATE annual report of 2015 states that the target for 2015 was to buy 700MT sorghum but bought 215MT sorghum. "During Ebola SLBL's business was low thus affecting its production thereby sorghum utilization was low. The [nucleus] farmers were restricted by the government to travel, thus buying [of sorghum] was limited (p.6)." It seems obvious that the farmer households have suffered since the number of informal traders decreased. However, there were less farm activities overall during the epidemic, markets closed and the price of imported rice increased. Sorghum being a resistant crop, may have added to food security of farmers.

The Ebola epidemic made SLBL decide to only ask the essential staff report for work. The other employees were asked to stay at home. The same was requested to the CREATE staff. The project agronomist only moved around to establish demonstration plots and to provide the pre-planting training. For the project it meant that of 32 nucleus farmers, 24 established a demonstration plot but eventually just 5 plots were successfully maintained. The initial introduced method in 2013 and 2014 was to mix crop sorghum with groundnuts. The resulting yields in 2015 from the 5 maintained plots established in 2014 indicated that indeed the introduced technique of row planting of sorghum has higher yields than mixed row planting and the broadcast method. On average sole row planting yields were 2570kg/ha; mixed cropping sorghum with groundnuts 1240kg/ha and broadcasting sorghum with groundnuts 1215kg/ha (CREATE, 2016).

During the Ebola crisis, it was difficult for the CREATE staff to monitor the sorghum business. On top, a new project coordinator was appointed in October 2015 and a new agronomist in the second quarter of 2016 before the pre-planting training of the season. The difficulty to

monitor and the change of staff also made it more challenging to collect information and to develop a plan for 2016. The country was declared Ebola free for the first time on 7 November 2015. Shortly after, as an impulse and fresh start, the CREATE project celebrated its re-launch on 14/15 December 2015. The delay in the CREATE project activities caused by the Ebola crisis played a key role in the decision to extend the CREATE project until December 2019 instead of 2016 (Van Aken, 2017).

Sorghum

First I will discuss what sorghum is and what position does it have in Sierra Leone households in general. Sorghum is a grain that is cultivated once per year. Depending on the variety sorghum can grow between 0.6 to 5 meters in height. In comparison to other cereal crops like wheat, barley and maize, sorghum is a very 'resistant' crop. It can be applied to a wide range of soil types and it is tolerant to long dry periods and arid land. The grain is usually cultivated without application of fertilizer. Sorghum is a source of energy, protein, vitamins and minerals. Therefore, sorghum is a reliable source of nutrition for both humans and livestock. Sorghum is applied in food products like porridge, cakes, couscous and malted beverages. It is often referred to as a 'poor people's crop' because it is mostly consumed by disadvantaged groups of subsistence farmers. Sorghum is normally cultivated as a mixed crop together with rice. On average per acre, one tomato cup of sorghum is mixed with a bushel (25kg) of rice and broadcasted onto the field (EUCORD, 2016). Sorghum is usually dried after harvest to be able to storage it for long periods. When the grain is too moist, yields will be lost.

The CREATE annual report of 2015 puts it bluntly that sorghum "is not sold at the local market". Farmer households eat sorghum during the hungry season when food reserves decline before they are able to harvest rice in November/December. The question could be raised whether it is a dangerous undertaking of SLBL to market sorghum from smallholder farmers. Two-thirds of the population are dependent on subsistence farming and the food insecurity rate is around 43.7% in 2015 according to World Food Program (2019). Sorghum adds to the food security of people. However, sorghum is not considered a staple food in Sierra Leone. In 2016 the consumption of sorghum in Sierra Leone is around 48MT in comparison to 1100MT rice (IndexMundi, 2019). Still, it is a question worth asking whether the CREATE project puts pressure on people's food security (Deters, 2011; FAO, 2019; Wisegeek, 2019).

Progress of the CREATE project: Production, Income and Costs

This section provides some baseline data on the income generation through sorghum and the production costs of farmers. The positioning and stakeholder relations can be laid against this information and further elaborated in the following chapter.

Farm size and production

The results from the survey on average production and farm size are displayed per district. The results on yield and farm size are shown in the below figure 2 and table 2. Figure 2 shows the average production of households in 2013, 2014 and 2015 compared between districts.

(source: own survey)

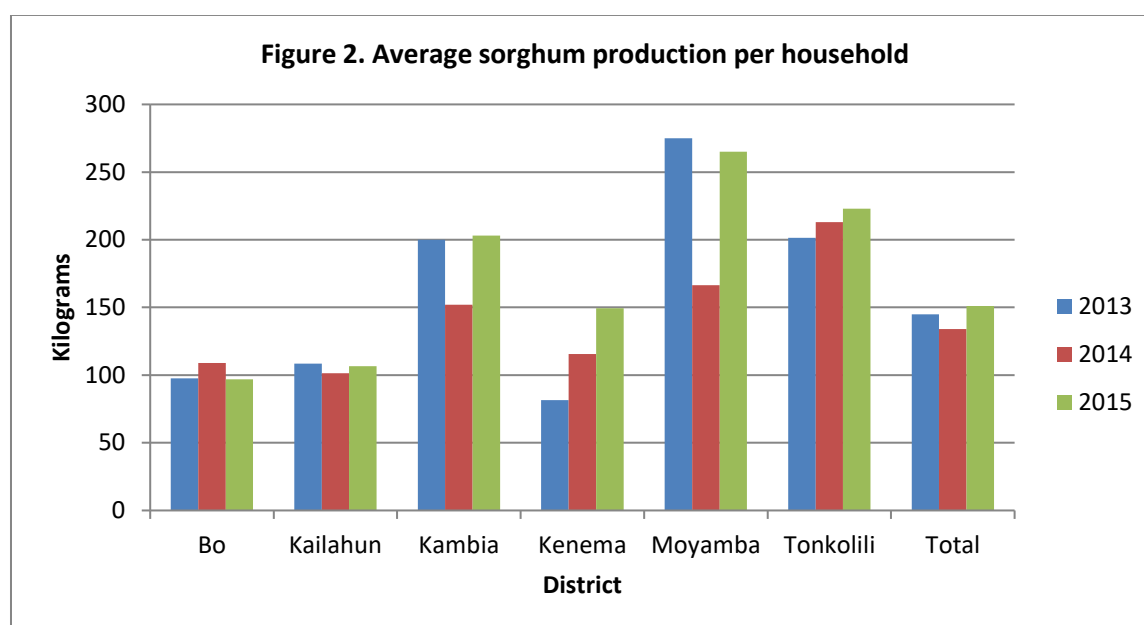


Table 2. Average farm size and production per district in 2015

Region	District	Avg. farm size in hectares	Avg. yield/ha. in kg.
North	Kambia	1.03	179
North	Tonkolili	1.01	210
South	Bo	0.91	111
South	Moyamba	1.66	142
South-East	Kailahun	0.65	162
South-East	Kenema	0.85	136
	Total / Average	0.92	157

(source: own survey)

Table 2 shows a total average yield of 157kg per hectare. Comparing this with the data on the demonstration plots established in 2014, the farmers produce around 10% of the mixed cropping techniques on the demonstration plots.

Districts in comparison to each other:

Bo: Low average sorghum yield, but compared to the other two Southern districts their average farm size is bigger. Via this survey a possible explanation for the low average yield could be crop damage caused by bush animals. Farmers in all the villages in Tikonko chiefdom have pointed out the severity of rodents damaging crops on the farms. A follow-up on crop damages during the survey in other districts shows differences between farmers with regards to their knowledge on crop damage prevention and preventive techniques. It is expected that

the average yield of farmers in Bo district increases when future training sessions concentrate on crop damage prevention.

Kailahun: The respondents from Kailahun produce slightly above the average yield. The farmers do have the smallest farms of the six districts included in the survey, which makes the production per household second lowest. In terms of the potential total production coming from Kailahun, the district makes up for the smaller sizes of farms as Kailahun district hosts around 1/5 of all the sorghum farming households according to received information from the Nucleus Farmers Organization.

Kambia: In this district the average farm size and average yield are second highest of the six districts included in the survey. The district is known for a traditionally greater focus on incorporating sorghum in the consumption. The fact that in one of the central towns in the district, three nucleus farmers do business with different groups of farmers could confirm the previous statement.

Kenema: In 2013 farmers had the lowest average production per household, but it increased strongly towards 2015; producing close to a 50kg bag more than the average household in Bo and Kailahun. This research is not able to provide a clear explanation. Just 25% of the farmers increased their farm size with around 0.2 hectares. Natural circumstance like good rains or higher yield per hectare seems more likely.

Moyamba: Moyamba has the highest farm size average and production per farmer. I should note that due to time and infrastructural constraints, only farmer villages near the main road were interviewed. Moyamba district is a swampy district where it is more challenging to find good farmland (Brother Alpha, 28-10-2016). This is not a trustworthy representation for the district further inland.

Tonkolili: The households in Tonkolili have the highest yield per hectare. Also, the average farm size of households in Tonkolili is second highest of the six districts.

Comparing the districts on average yield, production per farmer and farm size, the districts Tonkolili, Moyamba and Kambia are performing better than the South/South-eastern districts Bo, Kenema and Kailahun. Since the motivation and knowledge development of outgrowing farmers runs through nucleus farmers, it would be interesting to further research whether there is a clear connection between time of enrolment of nucleus farmers, amount of training and their approach of maintaining relations with their outgrowing farmers. At the moment I would say it remains a hypothesis that Kailahun and Kenema farmers are performing least because of the poor relationship nucleus farmers maintain with their agents and outgrowing farmers. In this line of reasoning, the small yields per hectare in Bo district are unclear to me. The interviewed nucleus farmers have affinity with farming, keep close contact with their farmers and encourage to experiment with sorghum farming techniques. The only possible reason I could generate is the possible severity of crop damage by rodents.

Therefore, it would be interesting to check the differences between districts in terms of the nucleus farmers' time of enrolment, received number and types of training sessions and how the nucleus farmers position themselves towards the farmers.

Income expenditure

Table 3 presents the different uses of sorghum income that are named most by the respondents. The respondents were free to give more than one answer.

Table 3. Top expenditure matters from sorghum income

Type of expense	Percentage of respondents		
	2013 (%)	2014 (%)	2015 (%)
1. School fees	78	65	69
2. Food	58	59	54
3. Health care	19	19	25
4. Paid labour	16	16	14
5. Business	9	10	7
Total respondents in real numbers	190	184	181

(source: own survey)

1. School fees: 'School fees' refer to several costs related to school payments for children. Parents need to take care of paying the yearly school fees, books, shoes, clothes and bag of their child. Besides most of the farmer respondents, nucleus farmers confirm that it is the most common sorghum income expenditure. 11 of the 12 nucleus farmers directly mentioned 'school fees' as to how sorghum income is used by farmer households. The Southern enumerator team exists of two teachers and a head of a school tell this common answer makes sense. Many parents in Sierra Leone are not able to take care of all these expenses at the beginning of the school year. Therefore, agreements are made between schools and parents to enable children to go to school. Commonly, parents are allowed to make payments before final exams take place or are being graded. The two enumerators and field supervisor agree that most parents pay their children's school fees at the end of the school year. The school year in Sierra Leone starts in September and ends late June. For many farming households the income from sorghum thus serves the purpose of paying their children's school fees, as they receive their sorghum income between March and June (Van Aken, 2017: Enumerators Evaluation. 19.10.2016).

2. Food: It is not surprising that close to 60% of the households spent their income on foodstuffs. In 2013 58% of respondents answered that they spent their income on foodstuffs and in 2014 and 2015 respectively 59% and 54% of the respondents. A SLARI employee provided the following additional information, which was later confirmed by the representative of the Sorghum Farmers Association: farmers receive their income from sorghum during the dry season and spend it on imported rice. Imported rice is much cheaper

during the dry season than during the rainy season. The price of a 50kg rice bag during the dry season is around 120,000Le or \$16 and during the rainy season 180,000Le or \$24. That means a 50% price increase of rice during the rainy season. The rainy season coincides with the hunger period. The scarcity of food supplies among households during the rainy season causes the price of imported rice to increase. Therefore, the farmer households decide to invest in imported rice during the dry season, when they receive their income from sorghum. With this strategy farmer households secure their local rice for more difficult times (Van Aken, 2017: Interview NF Kilo, 16-10-2016; Participant observation, 09-12-2016).

After the household survey, I met with two key informants including the project agronomist. Both senior men live in rural Sierra Leone and could further elaborate about the way sorghum money could increase food security among farmer households: many Sierra Leone farmers eat one full meal per day. When additional income finds them in a more comfortable position, the households will tend to increase their meals by adding a small meal of rice with palm oil in the morning. The rest of the income will probably be invested in petty trade activities (unstructured interview, 29-10-2016).

3. Health care: Around 20% of the households pay medicines or medical treatments. Transport and treatment can weigh heavily on household budgets. In 2016, a motor taxi ride from one of the far off villages to the nearest big city with a hospital would cost 15,000SLL one way (Unstructured interview Agent Kilo, 17-10-2016). This can cause people to wait with treatment until they can afford it or take loans from relatives to pay back later. As mentioned before, income from sorghum is received in bulk. This can be an outcome for households to access health care facilities and treatments. The 2015 increase 'health care' expenditure by farmer households from 19% to 25% of the households may have to do with the Ebola crisis. People either waited for treatments in 2014 during the imposed travel restrictions or possibly paid back debts for 2014 treatments when the Ebola epidemic was at its peak.

4. Paid labour: Labour-consuming work like land clearing and weeding possibly requires additional help besides the household members. In exchange for money and/or food for work farmers get support from others with farming activities (Richards, 1986). More information is provided in the upcoming section 'Production costs of farm activities'.

5. Business: This is an overall term used to include several activities. Around 7% of the respondents refer to investments into palm oil business. Others named producing and selling of coal and woodblocks, selling fish or doing business in rice.

Sorghum income in bulk

62% of the farmer households included in the survey call sorghum as their main income generating crop. The questionnaire included 5 answer options. Next was called cassava as the main income generating crop, by 14% of the respondents. Possible explanations to this answer: sorghum income is received in bulk, which is uncommon subsistence farmers who usually collect their income via petty trade and sales on the local market. With an average income of 117,500SLL (USD 43) from sorghum in 2015, to me it seems unlikely that it is indeed

the main income generating crop. However, gaining income in bulk from sorghum may indeed prove to be a strength of the sorghum market. It may add significantly to a household's ability to save up money to be able to make a certain investment, like for example their children's school fees. It seems therefore more likely to me that sorghum might not be the main income generating crop but rather the crop that is most important when you indeed receive income from it.

A sorghum farmer profile?

I wanted to find out whether I could pinpoint particular features that could characterize the farmer that is interested in sorghum cultivation. The answer is 'no'. A subcontractor with whom I got well acquainted, stated bluntly: "In Sierra Leone, every income is a welcome income" (Unstructured interview Sub-contractor Yele, 20-09-2016). According to him the combination of mix cropping rice with sorghum is a nice combination since there is a market that makes sorghum a possible form of income generation. The reasoning: "First rice is harvested, which provides food and some income. Afterwards, 3 months later the sorghum is harvested. It keeps the money flow going." I posted the question to an agronomist and nucleus farmer as well, who added that the entry level of cultivating sorghum is low (interview NF Kilo, 16-10-2016). Not much is needed to include sorghum into the farmer household's activities. It therefore seems like an interesting farm activity for many households. This is in line with Van der Ploeg (2013) his statement that subsistence farmers try to organize their activities as efficient as possible. Sorghum requires relatively little additional work and either: 1) saves rice from being eaten by rodents as rodents prefer the sweet taste of sorghum; 2) provides an income; 3) adds to the food security of farmers, supporting the household through the lean season.

Production costs for farmers

Concerning production costs, the questionnaire focuses solely on the production costs over 2015. The presented costs must be seen as an estimation. It is considered unlikely that the presented costs are an accurate representation of reality. Farmers do not practice bookkeeping. Furthermore hired labourers are often paid by providing the workers food for work or. Richards adds that the Mende, the largest tribe in the Southern districts, "*admire open-handed generosity. The suspicion that the donor might be counting the cost would altogether spoil the gesture. Consequently many farmers are not quite sure how much rice they might have cooked for friends and relatives or given away at impulse*" (Richards, 1986, p.102). Another important factor to take into account is that up until the harvesting of rice, the farming activities of sorghum coincide with rice farming. These shared activities include: land clearing, planting, fencing, ridging and partly weeding. Thus, it is difficult to come to an estimated average of sorghum farming costs.

Table 4 below shows the average costs per farm activity and the percentage of farmers that ascribe costs to the particular activity. I included the percentages since it depends per household and the size of its available work group whether it ascribes costs to a particular activity. Among the survey participants, 79% of the farmers only ascribe costs to the work of

paid labourers. This coincides with Richards (1986) his observation. Van der Ploeg (2012) explains that it is because of the atypical labour-capital relationship of substance farmers for not including costs for personal activities: an x amount of working hours do not relate to an x amount of income. The absence of a capital-labour relation requires the involved actors to make a subjective assessment on deciding the balance between what Van der Ploeg (2013) refers to as 'utility' and 'drudgery'. Drudgery refers to hardship like long working days. Utility refers to extra benefits provided by increases in production. Also in this light it makes sense, that resource poor farmers tend to hire extra labour for the most critical farm activities to gain good yields, as table 4 shows.

Table 4. Production costs per farming activity in 2015

Farm Activity	Avg. costs for activity (SLL)	Avg. costs for activity (USD)	Percentage of farmers ascribing costs to activity
Land clearing	30,548	7,36	96%
Planting	25,815	6,23	95%
Thinning	13,940	3,36	32%
Weeding	36,357	8,76	71%
Fencing	80,466	19.40	43%
Ridging	14,380	3,46	24%
Harvesting	86,076	20.75	64%
Threshing	59,587	14.37	37%
Winnowing	51,618	12.45	26%
Transport	61,171	14.75	34%
Human guards	81,656	19.69	16%

(source: own survey)

The information provided by the survey respondents can be made clear using Richards' (1986) study on the division of labour split over the particular farm activities. Non household labour is most important in the case of land clearing (i.e. brushing and tree felling), ploughing the field (necessary for planting) and harvesting. These activities require either casual hired labour, or more commonly, the assistance of a work group. This shows in the table as 96%, 95% and 67% of the respondents ascribe costs to respectively land clearing, planting and harvesting. Land clearing and ploughing are considered male activities as they demand hard physical labour. On the other hand, weeding relies more to the labour of women. Richards (1986, pg 94) mentions it as the "main labour bottleneck for women". Weeding demands similar work as ploughing. It shows in the data that 71% of the respondents ascribe labour costs to weeding. Why 20% less of the farmers hire additional labour for weeding than land clearing relates to the fact that the consequences are less severe when less attention is paid

to weeding than to ploughing. Mind that many farmers are resource poor and weeding coinciding with the rainy season, i.e. lean season. Not all farmers are able to provide additional workers a decent meal during this time of the year. Still, part negligence of weeding the farm does impact the yields negatively. The CREATE project's introduction of line cropping might prove to be a welcoming outcome for farmers, as weeding will be less demanding. Instead of moving around in a bush of crops as with broadcasting, line cropping provides a clear oversight of the farm field and it is much easier to move around.

Further, fencing and trapping is done to prevent rodents (cane rats or 'cutting grass'). As mentioned before, rodents like the sweet taste of sorghum. In Bo district several farmers shared stories of knowing a farmer that lost almost the entire sorghum production (Enumerators Evaluation Bo, 21.10.2016; Interview NF Rev K, 22-10-2016). Also Richards (1986) confirms that losses might be to oversee up to an almost complete loss of the farm's production. Sorghum farmers did tell that the rodents prefer sorghum and leave the rice unbothered. It is possible that sorghum cultivation adds to a farmer's food security by diverting the rodents towards sorghum instead of the rice as the preferred food. This will be further elaborated on in the upcoming section 'Food Security'.

Summarizing, sorghum seems an interesting income opportunity as few is required for farmers to incorporate sorghum in farming activities. It is a resistant crop. Cultivated together with rice, most farming activities are necessary for the rice farming and so in a way sorghum can free ride on those activities until rice is harvested from the land. Concerning the value of sorghum income for households, its main advantage appears to be that it comes in bulk. It allows households to make an investment without having to save up small amounts, running the risk of spending the money prematurely.

The production size of farmers is however small: a total average yield of 157kg per hectare. Comparing this with the data on the demonstration plots established in 2014, the farmers produce around 10% of the mixed cropping techniques on the demonstration plots. Labour shortages are the main hurdle for farmers to increase yields. Extra labour being required in the hungry season, while the farming household possibly faces difficulties itself, make it difficult for resource poor farmers to increase yields. The timing of farm activities, skills and availability of resources are fields where outgrowing farmer households appear to have much to win for increasing yields. As the CREATE project's activities all go through the nucleus farmers, this is an important group of actors that influences the development of the value chain. Therefore, the nucleus farmers form a centre position within the upcoming analyses; their role and influence on the operation of the value chain and the results of the project activities.

The next chapter looks at the way the CREATE project's activities are implemented, negotiated and in what it results are within the interface of the different actors down the supply chain. (What opportunities and challenges do the actors face by cooperating in the sorghum market?)

Chapter 6: Tensions in CREATE: Encounters at the interface between Heineken, CREATE and the various categories of farmers.

This chapter first explores the marketing possibilities for outgrowing farmers, consumption patterns and the possible effect the project has on food security. Afterwards I go into the positioning of the stakeholders within the value chain and what the possible impact is that the project has on farmer households' farming styles. Sorghum and cooperating farmers: usage and local market

Achieving food security among farmers is one of the main objectives of the CREATE project. This is done through marketing sorghum. Sorghum is a locally known and cultivated crop. This means the CREATE project intervenes within an already existing system of cultivation practices and usage. To be able to tell whether the project supports farmer households' food security, it can be important to become knowledgeable about the role sorghum plays within rural Sierra Leone society. That on itself may provide information on the room for manoeuvre farmers have with producing sorghum.

Consumption and local market

Observations and conversations during the household survey tell that the consumption preferences of sorghum vary highly. Communities in Northern districts are more commonly known to adapt sorghum within meals than communities among Southern district. In Kambia, around the borderline with Guinea, farmers grow sorghum in larger quantities as sorghum is more incorporated in households' consumption patterns. Three nucleus farmers work in Kambia with outgrowing farmers in the same area and even in a couple of villages. In Kailahun district in the South-East it is uncommon to cultivate sorghum for consumption purposes. During the end evaluation of the survey implementation in the Kailahun district, the enumerators agreed that the interviewed farmers do not like to eat sorghum at all. For some families, sorghum even appears to be a food taboo because it has something mystical around it; therefore, it is believed that when you eat it, something bad will happen (Enumerators Evaluation Kailahun. 19.10.2016). A nucleus farmer located in the centre of the country explains that sorghum also serves as dress up during certain ceremonies, like flowers can do in European cultures (Interview NF SA4, 27-07-2016). Although there are regional differences in consumption preference, the survey tells sorghum consumption also just depend on personal preferences. In the Southern districts there are also informants who tell they like to mix the sweet taste of sorghum with rice, which is the common way to implement sorghum in meals (Unstructured interview Farmer Zulu2, 21-10-2016). Concerning the ratio in meals, the common answer is to mix 2/3 of rice with 1/3 of sorghum. With Kambia being the main exception where the ratio sorghum/rice is more likely to be the other way around. Nonetheless, sorghum is an infant crop, not a preferred food. While sowing the land, one tomato cup⁷ of sorghum is mixed with one bushel of rice and broadcasted on the field.

⁷ A common measurement. 4 tomato cups cover 1 acre. Thus 1 tomato cup serves ¼ acre.

EUCORD its 2015 annual report states bluntly “sorghum is not sold at the local market”. Indeed, at local markets I have just seen sorghum being sold once at the big market in Makeni. During the farmer household survey, in just one village in Bo district (Zoker1) the lead farmer shared that there were some women who used sorghum for making cookies to sell around schools. Besides that, people sometimes feed chicken a bit of sorghum, but not much. Sorghum being an infant crop, the Sierra Leone government does not give attention to sorghum cultivation in its agricultural projects that aim to support farmers and production increases. These usually direct rice, cassava and cocoa production. Sierra Leone Brewery Limited thus provides a new income generation possibility for farmers.

Table 5. Sales of sorghum on the local market by farmers.

Year	Percentage of respondents selling on the local market	Average sales per farmer in kg.
2013	6%	80
2014	5%	70
2015	6%	60

(source: own survey)

A new market

The nucleus farmers all speak confident about getting smallholder farmers to cultivate sorghum. Seven nucleus farmers tell there are farmers who’ve approached them and are waiting for the chance to get included. Besides the income received in bulk that enables the farmer household to pay school fees, indications for farmers’ willingness to cooperate are discussed in the section ‘Nucleus farmer-Outgrower relationship’. The past recent years however showed to be challenging for the sorghum market however. This also influences the motivation of the already cooperating farmers. A drop in quota in 2012 because of the high sorghum stock at SLBL and the Ebola epidemic in 2014/2015 made it difficult for nucleus farmers to keep their cooperating farmers motivated to continue cultivating sorghum. As a SLARI agronomist and nucleus farmer tells: “This [low quota in 2012] caused farmers to be discouraged to farm sorghum. As an incentive for the farmers and maintain the number of outgrowing farmers it was decided [by the brewery] to have a high quota in 2013 (Unstructured interview, 16-10-2016).” However, the Ebola epidemic saw SLBL its sales drop with 70% with the demand of sorghum being low. Nucleus farmers therefore are reluctant to get new outgrowing farmers on board as some struggle to keep their current farmer pool motivated. A nucleus farmer in Tonkolili district expresses: “People want to join the program but I tell them: wait a bit. This is not yet a mature market (Interview NF SA4, 27-07-2016).”

Nevertheless, SLBL tried to show its long term commitment to the sorghum market by giving out quota to the nucleus farmers during the Ebola epidemic in 2014/2015. SLBL its forecast is that from January 2017 the sorghum market grows. The brewery installed a mash filter, enabling the brewery to increase the amount of sorghum into its beverages exponentially. Also, the so called ‘Finance Act’ of the Sierra Leone government installed in the last quarter of

2016 aims to tackle unfair competition in the market from illegal imported beverages and an increased import taxation. This factor is perceived to increase the market share of SLBL within the country and thus the demand of sorghum with it. Furthermore, in December 2016 SLBL added a new beverage to its consortium, 'Salone Beer': becoming a 100% sorghum adjunct beer that is meant for the market outside of Freetown. Its goal is to express local pride, SLBL's commitment to the country's development by including farmers into its business and the price is more affordable.

So although recent fluctuations put pressure on the sorghum market, it now is more of a question whether the farmers can serve the growing demand⁸. With SLBL and EUCORD this indeed is a thought of concern. As a measurement, the project coordinator introduced three new nucleus farmers as of the 2016/2017 season. Depending from the coordinator's information, it appears that nucleus farmers have contacts that are eager to join in the role of nucleus farmer too. EUCORD and HEINEKEN are however concerned whether they should continue to increase the number of people involved or get participants to increase their yields, becoming stronger partners and securing the market. The preferred strategy is to stimulate yield increase. Thus, the cooperation with SLARI to research potential adaptable high yield varieties of sorghum.

Lean season and threat of a single buyer market

To mix sorghum with rice is a common sorghum consumption practice among farmer households. This is mostly practiced to overcome the 'lean' season. This period coincides with the rainy season. Before the rice harvest in October, rural households may have difficulties to get sufficient food intake. Two agronomists confirm that the struggles are most common during the months August and September (Unstructured interview, 03-08-2016; Interview NF Kilo, 16-10-2016). The depleted rice stock is then mixed with sorghum to be able to still eat at least one full meal per day. It may be good to add Richards (1986) observation that facing difficulties during the 'lean' season for farmers means that they are

not able to consume the preferred foods. Most people refer to the difficulties when they are unable to access rice and/or palm oil. During August and September, I observed that the project agronomist kept harvesting crops from his field. He confirmed that in Sierra Leone you can farm different crops all year round for food and income generation. The problem is however, that not every farmer knows what to farm when. Sorghum is a go-to crop to secure the continuation of carbohydrate intake when facing difficulties during the lean season. According to Richards' ethnographic study on the Mogbuama village rice farmers (1986), every farmer has the chance to face a year of bad yields. Either because of long lasting rains, bad

⁸ The total number of farmers that cultivate sorghum for the project in 2016 is difficult to say. EUCORD and HEINEKEN safely express 'over 3000 farmers' (Apotheker, 2012). There is no baseline data on the outgrowing farmers, plus the data provided by the Sorghum Farmer Association on their outgrowing farmers appear to be incorrect. The farmer registration forms recently collected by the Sorghum Farmers Association doesn't coincide with the places visited during the households survey and are confirmed inaccurate by the CREATE staff.

timing, farming on a different soil type, sickness to maintain the farm, insufficient money to hire farming assistance. Before the project was introduced, sorghum was mixed cropped with rice as a food safety measure.

Table 6. Sorghum consumption among farmer households.

Year	Producing households (total 235 respondents)	Total sorghum production in kg.	Sorghum available in kg. for consumption/local market (i.e. not sold to the nucleus farmer)	Consuming households in percentage	Total sorghum consumption in kg.	Percentage of available sorghum consumed in particular year	Average sorghum consumption in kg.
2013	201	29,728	7,308	64%	5,600	77%	43.5
2014	200	27,303	6,981	59%	5,130	73%	26
2015	204	29,525	6,575	60%	6,070	92%	49.5

(source: own survey)

The question arises whether the CREATE project isn't buying a crop from farmers that potentially saves them from hunger. Below, table 6 shows how much sorghum has been available for consumption, the percentage of respondent households consuming sorghum and the amount consumed during the past three years.

The table shows around 60% of the farmer households consume sorghum. From the sorghum that has not been sold to the nucleus farmer and thus available for consumption, the households consume around 75% of the available production. In 2015 however, 92% of the available sorghum was consumed. A possible explanation for this high increase of consumption could be related to the Ebola crisis. It is common in Sierra Leone that people's farms are at a far walking distance from their village. Travel restrictions and the severity of the Ebola virus in 2014 possibly denied farmers access to their farms. The lack of attention to the farm might have affected the yield of crops negatively.

It also must be reminded though that sorghum is an infant crop, not receiving any attention by agricultural food projects in Sierra Leone. Not all farmer households broadcast sorghum or eat it when in need. This research doesn't have a control group but depending from the data and common story that sorghum is not a preferred food crop, the fact that 73 to 92% of unsold sorghum is consumed may conclude that, even though in the unfortunate circumstance of non-sales, sorghum has contributed to food security among farmers and maybe even adapted more into the menu.

Besides the amount of sorghum consumed, it can be informative to know the intentional purpose of the sorghum production by the households. The next table shows results on the following questions: How many households sell their entire production? How many households are left with production unable to sell? How many households intentionally kept part of their production for own consumption?

Table 7. The intention of households' sorghum production

Year	Producing households	Nr households selling everything	Nr households unable to sell >0 kg. to the nucleus farmer in particular year	Avg. amount of sorghum unable to sell to nucleus farmer in kg.	Nr households intentionally keeping sorghum for own consumption
2013	201	93 (46%)	108 (54%)	73	21 (10%)
2014	200	100 (50%)	99 (50%)	63.5	19 (10%)
2015	204	100 (49%)	104 (51%)	66.5	19 (9%)

(source: own survey)

The table shows that 10% of the total households intentionally keep part of their sorghum production for private consumption. Two conclusions can be drawn on the data of Table 6 and 7:

1. The majority of farmer households intend to sell their entire sorghum production; and
2. Even though table 7 shows that 50% of the households remain with sorghum production they intended to sell, table 6 shows that the majority of the remaining production is consumed.

Assuming that farmers answered correctly to the questions, it is interesting that also in 2013 – a year where SLBL intentionally put out higher quotas - around 50% of the farmers were unable to sell their produce. I expected that most farmers would have sold their sorghum. The CREATE annual report of 2015 explains SLBL sent out quotas during the Ebola epidemic even though not expecting that farmers would be able to produce. However, also during the epidemic farmers appeared to be left with cultivated sorghum. Apparently the nucleus farmers reached their quotas with farmers left with sorghum intended to sell. In section 'Project Knowledge Transfer' the research tries to answer the question how it is possible that such a great amount of farmers is left with their produce.

Sorghum consumption per district

During the qualitative study previous to the household survey it seemed that the preference to consume sorghum differs per district. Informants shared that in the Northern districts (Kambia, Tonkolili) households are more used to including sorghum in their meals. In the South and South-eastern districts (Bo, Kailahun, Kenema, Moyamba) farmers would leave their yield untouched or use it as poultry feed when they are unable to sell their sorghum to the nucleus farmers. However, the results from the household survey in Figure 1 shows that the differences aren't as big as expected between districts.

(source: own survey)

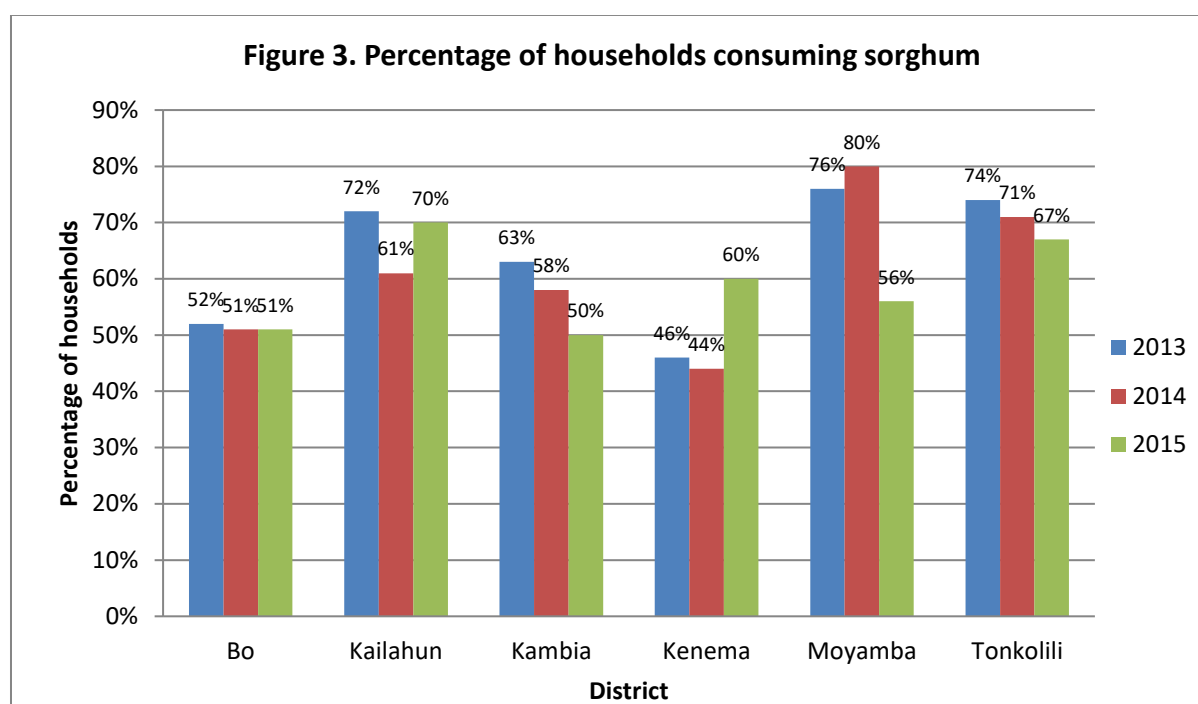


Table 7 on the previous page shows that around 10% of all respondents kept sorghum intentionally for their own consumption. This means that most farmer households that consumed sorghum were left with produce they intended to sell. Relating to conversations with informants and stakeholders it is positively surprising that around 50% of the households in the Southern districts Bo and Kenema consume unsold production. In Moyamba district even up to 80% of the households consumed unsold sorghum production in 2013 and 2014. Also, in the South-East district Kailahun more households consume sorghum than farmers in Kambia, which is a district perceived by informants as being in favour of eating sorghum.

Concerning that sorghum is a security crop, it is possible that differences in weather and the development of the Ebola epidemic are reasons for the higher consumption numbers of sorghum in Kailahun and Southern districts. Many farmers could not sell their sorghum to the brewery, but also many households faced food insecurity because they were unable to maintain their farms. Additionally, considering Richards (1986) statement that every farmer has the chance of once facing bad yields also means that if a sorghum farmer has sorghum excess he might be able to provide food for community members in need. As a nucleus farmer states in our conversation: “When we exceed the quota, we distribute the sorghum leftovers amongst ourselves for food (Interview NF Sister, 29-07-2016).” It would be interesting to compare the sorghum consumption of households producing for SLBL with the consumption of households in villages that do not take part in the supply chain. It is possible that the number of households that consume sorghum increased since they started producing sorghum for the brewery.

Nucleus farmer – Outgrower Relationship

The amount of sorghum left for sales gets me to the question of why is this the case? If the farmers make an investment they are unable to convert into revenue that might leave them in debt. In order to gain an answer, this section looks at the relationship between nucleus farmers and their outgrowers. How do they communicate and maintain their cooperation?

Investing in the outgrowers

Starting as a nucleus farmer in the sorghum market wasn't for everyone an easy task. Some nucleus farmers were first working in farm groups themselves like NF Lima. Others were already running an FBO and thus had a network of farmers to cooperate with. However, for nucleus farmers who were engaged in several businesses but not necessarily focussed on the farming business could find it more challenging. One respondent NF Sierra (Interview, 02-08-2016) states that the year she started it was quite difficult to convince farmers to join her. Sorghum was never really given attention too. So now with an infant market and infant crop, one of the challenges nucleus farmers face is keeping the outgrowing farmers motivated to maintain their work relationship, especially during the fluctuating quotas from 2012 until 2015. NF Echo (interview, 30-07-2016) tells: "Some farmers tend to see me as a liar because they see me as responsible for the low quota. I try to tell them that not me but the brewery is responsible for the low quota." Because of the recent demand fluctuations nucleus farmers stick with their existing farm groups and wait to include other farmers until the moment the quotas go up.

In order to maintain good relationships, nucleus farmers provide support, either as a one way encouragement or by providing loans. Monetary support seems to be a motivator for farmers to get involved in sorghum farming. NF Yankee (Interview, 26-07-2016) tells: "people ask to join because the farmers see that she is treating the [farm] groups well." Nucleus farmers do this in the forms of:⁹ 1) providing medicine, often related to relief pain from hard physical labour like groin rupture. 2) provision of work material like tarpaulin to dry sorghum on. 3) providing farmers loans in order to pay for paid labour to help work on the farm¹⁰. This is either in money or in food.

In Sierra Leone it is difficult for farmers to get a loan from a bank because of conditions attached which farmers cannot meet. In order to get financial assistance, a VSL, the community patronage system or now possibly a nucleus farmer can provide as a solution. Several communities work with a Village Savings and Loans (VSL). This is a safety and health insurance system for when a member is in financial need because of hospital treatments for example. Also a farmer can request a loan from the VSL savings in order to meet farming work requirements. Community members chip in a certain amount per week. A lead farmer in Kailahun provides the example of 2,000SLL per week (Enumerator evaluation, 19-10-2016).

⁹ In no particular order

¹⁰ More of this in section xx

Another possibility for help is the patronage system, previously discussed under 'Division of Labour'.

Provision of loans by the nucleus farmer

The CREATE project's system of working through nucleus farmers appears to open a route for farmers to access loans. Normally, it is very difficult for resource poor farmers to get a loan from a bank. A possible loan from a nucleus farmers somewhat differs from the patronage system. Namely, the nucleus farmer (often) isn't part of the farmer's community and thus not involved in further political plays. It can be interesting for a nucleus farmer to hand out loans because it strengthens the relationship with the outgrowing farmers. On top, the risk the nucleus farmer takes to provide loans is very low. As NF Alpha Sierra explains: "Sorghum doesn't disappoint. When you grow it, it gives proper yield. So people are always able to harvest enough sorghum to meet their loans (interview, 24-10-2016)." The nucleus farmer settles the loan with the sorghum provided by the farmer. What may distinct the loan from a nucleus farmer in comparison to the one from a patron is that the loan is unlikely to place the farmer in debt. The loan enables a farmer to make investments which would otherwise be out of reach due to a lack of resources and the challenge of finding enough labourers. Having less family members at your disposal to work means more labour is requested from less people.

Richards (1986) states that "small scale producers are quite tightly constrained by labour shortages. Especially seasonal labour bottlenecks." NF Foxtrot Kilo explains: "Farmers use loans to pay workers on the farm and provide food. Some buy a hoe or cutlass too. A hoe is expensive: 30,000 to 50,000SLL (interview, 24-10-2016)." Alpha Sierra adds that farmers also request or use a loan for when they are sick themselves and hire paid labour, already pay for school fees or take care of health care payments. By selling the sorghum to the nucleus farmer, both parties are ensured of paying back the loan.

Thus a loan from a nucleus farmer increases the chance of breaking the poverty cycle – being a positive investment –, whereas a loan from a patron may be purely for survival during difficult times and places the loan taker into debt with the patron. It must be noted however that both the nucleus farmer loan and the patronage system serve an important role. As Richards (1986) states, the patronage system is widely supported in Sierra Leone, as it functions as a security system for difficult times. Both channels may provide a safe environment to the farmer to experiment to a certain extend with newly introduced techniques.

Who can get a loan? NF Alpha Sierra provides loans according to the previous production of the farmers. Depending on how many bags they supply, she decides on the height of the loan she provides. NF Foxtrot Kilo lets her agents and lead farmers decide who gets a loan, because they know better to decide who is capable for a loan. Both nucleus farmers are not worried that farmers do not pay back their loans. The fact is that there is just one market. Foxtrot Kilo: "the local market just buys small quantities, so no one escapes to sell their sorghum to me. [By extracting the loans from the sorghum income] there is no way that the farmers escape to pay back their loan" (interview, 24-10-2016). Investing in farmers by providing loans is thus a safe method. Sorghum being a resistant crop provides a production guarantee and since there

is just one market, there is a loan pay back guarantee as well. Sorghum, not being a preferred food crop, seems like a perfect business product for farmers that enables them to invest in further farm activities and the well being of the household.

Agents about their relationship with nucleus farmer and outgrowers

The nucleus farmer works largely via agents and lead farmers. During the household survey we have interviewed and observed eight agents. Everyone of these agents also serve as a lead farmer. They take care of the demonstration plot, communicate about the conditions sorghum needs to be cultivated against, monitor the cultivation, harvesting and drying process, the buying and collection of sorghum and arranging local storage facilities. Some nucleus farmers farm themselves and discuss with farm groups techniques and methods. Others rely mostly on the agent, like the nucleus farmers who live in Freetown. The agents are an important link in communicating with and transferring knowledge to outgrowing farmers in the sorghum supply chain.

Nucleus farmers are business men and women with several activities running at the same time. Most of them run the sorghum business together with some agents. The locations of farmer villages are quite a distance from each other, travel times between villages are often 30 minutes and up to 2 hours of driving are not surprising. (Provision of motorcycles could also fit here) To be able to monitor the activities, it is necessary to cooperate with agents and lead farmers. Some nucleus farmers and agents farm themselves as well and some just take care of the business. In many cases the communication between the nucleus farmer and the outgrowing farmer goes via an agent. While conducting the household survey I found that the bond between the nucleus farmers and agents differ greatly. In total I have observed, spoken and interviewed 8 agents from different nucleus farmers in the 6 visited districts during the household survey. Depending from the interviews with nucleus farmers, agents and observations, I believe it is important to point out the seemingly different intentions of nucleus farmers to step into the sorghum business. Based on fieldwork there seems to be a correspondence between intention and the work relationship with agents and outgrowing farmers.

Care for farmers results in farmers caring for sorghum

During the survey implementation it appeared that four agents have a troubled relationship with their nucleus farmer in the South and Eastern districts of Sierra Leone. An agronomist related to the CREATE project for several years confirmed that indeed these agents deal with poor treatment from nucleus farmers. The agents explain the nucleus farmer does not compensate them fairly for the agents' efforts. Agent Kilo tells he does not receive compensation at all for his effort of buying and collecting sorghum from the surrounding villages. On the question why he continues with this work he answers "maybe in the future someone else will also help me in the future and return the favor of my work for others" (Unstructured interview, 17-10-2016). The agent in Kailahun drives a dangerously damaged motorcycle in the mountain terrains, which has left him staying overnight in far off places more than ones. Also, he does not receive compensation for his monitoring work before the

sorghum gets harvested. The reason for continuing the partnership with the nucleus farmer is similar to the answer of the other agent: “you never know what the future of this business will offer you” (Unstructured interview, 19-10-2016). These work relationships are possible in Sierra Leone as chances of economic prosperity are very limited. Work for minimum compensation is considered better than no work at all, in the hope that your efforts eventually will be recognized.

All four agents who face poor work relationships are cooperating with nucleus farmers who do not show affinity nor practices farming themselves. They are pure business oriented and reside in one of the bigger cities of Sierra Leone. It may be no surprise that the visited farming communities that sell their produce to one of these nucleus farmers show to be less knowledgeable. During the evaluation with the enumerators in Kenema, the enumerators observe that the farmers related to the poorly treated agents “aren’t even doing their best to cultivate the sorghum because they are not being encouraged” (Enumerators Evaluation Kailahun, 19-10-2016). As a previous project coordinator Ivan Carol also points out in Deters (2011), people want recognition for their work. Moreover, within a ‘high context culture’ as in Sierra Leone, trust is build on personal relationships. Showing your face, interest and care are important to maintain a good work relationship. They serve as incentives for farmers to cooperate.

For three (male) nucleus farmers an explicit incentive to get involved with the sorghum project was to create an income generating activity for their home region. Besides petty trade, income generating activities are lacking in rural Sierra Leone. Seeing that farming households also invest the sorghum income well, gives the nucleus farmers satisfaction and recognition of their efforts (Interview NF Sister, 29-07-2016.; Interview NF Echo, 30-07-2016; Interview NF Zulu, 30-07-2016). One of them built a rural medical post and several toilet buildings in one of the bigger towns from the sorghum profit. Most nucleus farmers that were visited and reside outside of the bigger cities, thus more in touch with rural life, show to take their relationship with the cooperating farmer villages serious.

It then remains a question how it is possible that 50% of the farmer respondents remain with unsold sorghum between 2013-2015. The buying strategies of nucleus farmers provide some insight, which a will come too soon.

Opportunity for women

One of reasons why outgrower households seem to be spending their sorghum income to the developmental benefit of the household, is because mostly women take charge of the income. As sorghum is a mixed crop, it traditionally falls under the responsibility of the women to take care of (Richards, 1986). This is both concluded by nucleus farmers as well as the enumerators while evaluating the second district visited conducting the household survey. Male farmers are responsible for the rice cultivation, as it is the main staple crop. After the rice is harvested from the field, men don’t really look after the farm anymore. Women are responsible for sorghum production and its sales. They are able to take charge of the income generated from sorghum and to take care of the family. By male nucleus farmers and professional

enumerators Sierra Leone women are perceived to be more serious when it comes to taking care of the household. SLARI agronomist and nucleus farmer Echo tells that women will provide essential things for their children like an extra pair of school uniforms for example, which might not be considered as important to the men (Interview NF Echo. 30-07-2016; Unstructured interview NF SA4 27-10-2016).

Are the female farmers allowed to keep the full income themselves? It depends on the particular household arrangements. The enumerators deem it possible that men keep 20,000SLL of the 100,000SLL earned from the sorghum income for themselves, but not much. It is reasoned that, as women are most responsible for taking care of the household, men are aware they need to provide their women some financial space of movement (Enumerators Evaluation, 19-10-2016). Furthermore, Echo explains that most women will prefer to keep their income to themselves rather than sharing it with their husband. Especially in polygamous households as women can be afraid that their husband might spend the provided money to another lady.

During a conversation with SA4 he mentioned that it could be possible that men will take over the sorghum production when the activity becomes more profitable (Unstructured interview NF SA4 27-10-2016). For now however, sorghum appears to be an income generating activity that likely belongs to women.

Interest in production on a bigger scale

The latter is appears exactly where the project still has a lot of room for development. At several locations (Tonkolili, Kambia, Kailahun, Bo) chiefs or lead farmers expressed their interest of investing in the sorghum business by cultivation on a broader scale. In contrast to research in other African countries, there is land enough available in Sierra Leone to increase the scale of farming without having to confiscate someone's land (Richards, 1986). Observations while travelling through the country and conversations with chiefs and farmers confirm that it's still the case to date. Moreover, land grabbing or anything similar is not the case in Sierra Leone and is unlikely to occur with the CREATE project. Which is an important statement to make since the critical academic literature state that contract farming projects are often plantations in disguise (Oya, 2012).

To the reason for some individuals or farm groups to produce sorghum in large quantities already, the agent in Kailahun explains that sorghum can be sold in large amounts. For crops like cassava this is not the case, as nobody will buy 20 bags of cassava. To make cassava interesting for sales on the formal market, people need to invest into a machine that processes the cassava into garri. A readymade market that enables farmers to produce a crop on a larger scale is thus interesting for farmers like chiefs who have a larger investment budget, as these opportunities are rare. A logical question then is, why do these chiefs, lead farmers or FBOs not invest on a larger scale already? The logical explanation to me would be the past fluctuations in demands. Plus, in a high context culture, business relationships depend on trust. As contracts run through the nucleus farmers, the question is whether the business relationship between the investment savvy farmer(s) and the agent and/or nucleus farmer is

good enough for the investing farmer to rely on. It is possible that direct contact with the buyer-processor is required to get investing farmers/farm groups on board to produce on a larger scale.

Different buying strategies

Many nucleus farmers outsource the buying and collection of sorghum through agents. The task is too time consuming to do it by yourself. The right harvest time varies per location and the sorghum requires to be threshed, winnowed, dried and bagged. Nucleus farmers receive 100,000SLL per sold 50kg bag. The nucleus farmer is free to negotiate the price the nucleus farmer is willing to pay the outgrowing farmer. It seems an unwritten rule or etiquette is to pay farmers 80,000SLL for a 50kg bag.

Table 8. Average price paid per 50KG Bag.

District	Avg income per 50kg bag¹¹ in SLL	Nr of respondents included in calculation (total respondents)
Bo	54,500SLL	30 (45)
Kailahun	54,400SLL	46 (68)
Kambia	70,000SLL	18 (32)
Kenema	52,600SLL	24 (24)
Moyamba	77,400SLL	17 (19)
Tonkolili	77,100SLL	20 (32)
	Avg. 64,300SLL	155 (235)

(source: own survey)

Most nucleus farmers tell that they pay farmers this price. That would mean that the nucleus farmer receives 20% of the price per bag, namely 20,000SLL. However, the nucleus farmer have complete freedom in deciding their buying strategy and prices they pay to the outgrowing farmer, as the project doesn't control it. Based on the conducted household survey it appears that nucleus farmers and their agents, depending on their buying strategy, use different prices. Table 8 shows that the price differences result in broad income

¹¹ In the calculated average prices the answers of respondents below 20,000Le and above 102,000Le per bag are left out. This is for the reason that these extremes are considered too unrealistic. When all the indicated prices per bag are included, the average price anfarmer receives is 94,609Le to 104,118Leones per bag. This would mean the nucleus farmer makes a loss by doing business because SLBL pays 100,000Le per bag. By leaving out the extremes, the average price per bag is also in line when crosschecked with an additional survey question on received prices: 66,160Le per 50 kg bag.

differences between farmers. Agent S Alpha Sierra (unstructured interview, 25-10-2016) tells his job is as follow: The starting price for sorghum is 40,000SLL to 60,000SLL for 50kg¹². If his nucleus farmer needs more sorghum to reach the quota, they buy at a maximum of 80,000SLL per 50kg bag. In Kambia district people are keen on eating sorghum. So apparently the nucleus farmer's strategy is to first see how eager people are to sell their sorghum by starting with a low price.

It appears that 31% (72 respondents) of the respondents state that the prices they receive from the agent fluctuate between the years.

In deciding where to buy sorghum first, there are several factors mentioned by agents and nucleus farmers: distance and accessibility, time, strong ties. There appear to be no demographic differences in treatment.

Distance and accessibility by road: in Kambia district most sorghum farming villages are close near the Guinea border. The roads however are relatively well maintained. Sending out trucks seem to give minor issues. Kailahun however is a mountainous area. The agent tells that he buys sorghum at the nearby villages first. If he needs to buy more sorghum to reach the quota he will travel to the more remote villages. Roads however may be accessible only by motorcycle, which can carry two 50kg bags per ride (Unstructured interview Agent Sierra, 20-10-2016). Thus, the farther off villages have more chance to stick with unsold sorghum.

Time: first come, first serve. Since the nucleus farmer and agents need to undergo the process of collection, drying, bagging and delivering sorghum within a given time frame they do not bother favouring the one farmer above the other. The faster you collect the sorghum, the faster you can continue with the process and the less time and chance there is for the sorghum to get damaged while lying in storage. While stored away the moisture level of sorghum can increase and rodents may have a go at it. Local storage facilities usually exist of an emptied room in one of the dwellings, not meant for storing produce.

Strong ties: Farmers and communities that have stronger ties with the agent or nucleus farmer are logically in a favourable position for sales. Likely friends, family members and farmers that help maintaining the demonstration plot. NF SA4 (unstructured interview, 27-10-2016) tells that the location where his sisters are active, collects between 100 to 200 50kg bags of sorghum. He tells he already closes deals with farmers while the sorghum is still on the land.

Another factor will be the recollection of loans: nucleus farmers who have handed out loans to farmers will buy sorghum of these farmers to deduct the loans from their sorghum income.

Still, how can it be explained that in some villages some producing farmers were able to sell their sorghum and some did not? Besides a farmer's post-harvest activities, it has to do with communication. A farmer may be late with threshing, winnowing and drying due to the occupation of other activities. In one village in Bo district a farmer tells me that it can simply

¹² 2,000SLL to 3,000SLL per three pence pan. Which is a common measurement form. Twenty of the 'three pence pans' make 50kg.

be bad luck (Unstructured interview, 21-10-2016). At some point a messenger will come to tell the village that at a certain day they will come and buy the sorghum. A farmer can simply miss this information and be out of luck. Another reason comes from an agent in Kailahun. While visiting a village during the household implementation he was content but also burdened by the fact that farmers were now eager to start cultivating sorghum for the market, since the survey team arrived to talk about sorghum. Before, not everyone wanted to sell their sorghum at the time the agent came to buy. Farmers tended to keep their sorghum as a form of savings: "The farmers still had some money left in their pockets and wanted to wait with selling their sorghum. The farmers are afraid that they misuse their money, spending it too quickly, and not putting it there where it is needed most (Unstructured interview Agent Sierra, 19-10-2016)." However, there is a particular time that the agent buys the sorghum from farmers. So the farmers who would like to hold on to their sorghum for a while take the risk of not being able to sell their sorghum at all in the end because the agent may have already reached his purchase quota. Basically, a lack of proper communication will eventually disappoint farmers.

Peasant farm resilience

"Peasant farms are often engaged in economic activities apart from farming. These help them to survive during low price periods. In short, peasant farms are far more resilient than capitalist farm enterprises (Van der Ploeg, 2013: p.120)." In light of the Ebola crisis and the fact that the project is only producing for the local market, which isn't developed much as Sierra Leoneans don't drink much, this information from Van der Ploeg could possibly make peasant farmers a more welcome producer group than entrepreneurial farms at this stage of the market context.

The above information shows that – even though SLBL through the agents of nucleus farmers wasn't able to buy their sorghum – peasants will remain there; they are not businesses that go bankrupt or leave the country because of the Ebola epidemic. Besides agriculture, rural households partake in different food and income generating activities such as the sales of kerosene besides the road, honey, cookies like rice, sesame and coconut cake, fishing and hunting. Additionally, some people have small shops where they sell goods such as maggi, cigarettes and cell phone airtime.

The most likely factors for not investing further in sorghum cultivation are probably 1) most farmers are resource poor and unable to make the necessary investment. 2) the lack of communication or strong ties between nucleus farmer/agents and willing to invest chiefs and lead farmers. 3) the insecurity of demands and sales. Through spreading food and income generating activities, the farmer household distances itself from becoming dependent on the sorghum market. It protects itself from the insecurity that the market brings (Van der Ploeg, 2013).

A possible positive influence on strengthening the relations between nucleus farmers and outgrowers are the provided motorcycles: Upon request from the nucleus farmers, SLBL provided motorcycles in form of a loan to nucleus farmers who were financially trustworthy

during the CREATE project re-launch in November 2015. In Sierra Leone it is a challenge to buy a new motorcycle as the process of requesting a new license plate takes months due to the slow process plus employees are motivated by the provision of financial extra's, demanding many visits to push the process. It is a costly and consuming process. The provided motorcycle by SLBL aids nucleus farmers in the ability to visit cooperating farmer communities more frequently. The motorcycles also serve as a means to transport two 50kg sorghum bags at once over roads inaccessible for trucks (Interview NF Mike, 29-07-2016).

I had the assumption that the quota were known before planting sorghum, so in May. This way the farmers could in theory consider the amount of farmers to include in the upcoming season's cultivation. After checking with the project coordinator it actually appears that the quota are provided right before the harvest time begins, in December. This means that farmers have to deal with insecurity about whether or not they will be able to sell their sorghum. At least, this will go for the farmers that have a disadvantage over the buying strategy of the agent, in the form of accessibility, distance, time of preparing the sorghum for sales and ties. The lack of proper communication about the quota and possible sales provide a reason for discouragement among farmers and the fact that nucleus farmers state they faced the challenge of keeping farmers motivated to cultivate sorghum. It could be possible that farmers are unable to repay their loans at the VSL and run the risk of not receiving a loan for the upcoming year.

Two nucleus farmers express they already buy/estimate the sorghum while it is still on the land (data). Rev K (unstructured interview, 22-10-2016): "Every November I do a survey to depend how many farmers cultivated sorghum and what the expected yield will be." SA4 already buys the sorghum while it is still on the field. As he states: "Right before the harvest you already know what the estimate yield will be of the plants. This way [by buying the sorghum in advance] I am sure to reach my quota (unstructured interview, 27-10-2016)." The cooperating farmers will save themselves a potential loss of further investment, because they know before harvesting whether their sorghum will be sold.

Two other nucleus farmers buy the sorghum from farmers even when it exceeds the quota. It is a form of long term investment into the business, by maintaining a good relationship with the farmers. The two nucleus farmers were able to sell some of their stock to other villages, WFP and a children's nutrition company.

It may be good to say that these nucleus farmers are in close personal contact with the outgrowing farmers, are educated, live in the rural districts and two of them farm themselves. The new project coordinator observes that similar virtues indeed encourage to reach project targets. Therefore the project started to select new nucleus farmers on farm affinity, rural location and business experience.

Loan provision from a nucleus farmer seems like a win-win strategy. The outgrower is able to invest in farm activities while the nucleus farmer is certain of produce and loan repayment on short term. For resource poor farmers the loan increases their chance of breaking the poverty

cycle. Their yields will cover the loan repayment and the farmer will not risk a dependency position towards others as with the patronage system. Furthermore, a loan ensures sales as the nucleus farmer will be keen to recollect loans. The household survey shows that 50% of the farmers were unable to sell their produce at least once between 2013-2015. Travel restrictions during the Ebola epidemic have been of influence. Also, infrastructural challenges like cell phone coverage, bad roads and distances are hurdles in the communication. Plus, receiving quota's just before harvest time doesn't help. Still, the lack of communication and specific buying strategies will have caused farmers being left with their produce. It will have farmers second guess to invest in sorghum production where agreements are based on trust.

Project knowledge transfer

There are four basic knowledge necessities that need to be taught to the outgrowing farmers in order to be able to sell sorghum produce to SLBL. 1) Sorghum comes in a red and a white variety. Only the white sorghum is used in the brewing process. In the first stage of the project not all outgrowing farmers were aware, but during this research in 2016 this showed to be common knowledge among farmers over all districts. 2) The quality standard needed for the brewing process is different than the local standard for consumption purposes. Nucleus farmers and agents check the farms themselves and share local methods to decide if the sorghum is ripe for harvest. 3) while drying the sorghum, farmers preferably need to use tarpaulin or else a drying floor to minimize stones and rubbish to mingle with their produce. Often farmers use the clean swiped ground to dry their rice, which is liked to be prevented. 4) A recently introduced quality standard is that the sorghum moisture level should not exceed 11% or else SLBL will not buy the sorghum. This falls under the responsibility of the nucleus farmers. After buying the sorghum and transporting it to the nucleus farmer's main collection point, the sorghum is dried again for safety measurement and quality checked by a project related agronomist with a moisture meter.

To be able to cultivate sorghum for SLBL, the entry level for farmers is thus very low. On the farming side, only white sorghum is cultivated and sorghum needs to be harvested at the right moment. On the market side, the nucleus farmers are willing to cooperate with new farmers when their quota, i.e. the demand of the brewery, lets them. Further knowledge and training on sorghum farming is all meant to increase farmers' yields.

Demonstration plots

In 2013 the CREATE project introduced demonstration plots to teach farmers best practices. The plots consist of three parts: the traditional cultivation method of broadcasting rice together with sorghum, line cropping of sorghum and rice, and sole cropping sorghum in lines. The demonstration plots are aimed to increase farmers' yields while reducing the amount of work. The plots are still in a development phase. In 2013 the demonstration plots were introduced by mix-cropping sorghum together with groundnuts, as these two crops go very well together. The project however decided to switch towards mix-cropping sorghum with rice as this is common practice among farmers. It shows that the project tries to adapt to local customs. With the instalment of a mash filter to be able to process more sorghum in the

brewing, has in mind to upscale its sorghum use and thus an increase in demand. Because of the Ebola epidemic, in 2015 just 5 demonstration plots were fully completed. The mixed cropping shows higher yields than broadcasting. The 2016 season is expected to be the first year to see the results on a broader scale.

The newly introduced techniques are not pushed onto the outgrowing farmers. The CREATE project has the deal with nucleus farmers that each nucleus farmer establishes a demonstration plot and brings outgrowing farmers/lead farmers to maintain the plot and see for themselves, which of the three demonstrated methods has the farmers' preference. Thus, the choice is left with the farmers.

Several nucleus farmers and agents express there to have a handful of farmers that decided to either experiment with line cropping (Unstructured interview Lead Farmer Zulu1, 21-10-2016; Interview NF Sister, 29-07-2016) and broadcasting sorghum separately (Unstructured interview Agent Sierra, 19-10-2016). It is safe to say that this is less than 1% of the farmers. One of the possible reasons for not copying and experimenting on a larger scale is that the demonstration plots have their first real trial in 2016 of rice/sorghum mix. One of the reasons farmers give for broadcasting is that more crops on the field will provide a higher yield. It doesn't seem to be the main reason however. Some nucleus farmers seem sceptical about the effect of introducing demonstration plots or line cropping in general. SA4 (unstructured interview, 27-10-2016) tells that sorghum cultivation is handed over from generation to generation via the traditional way (which is what many nf tell). Farmers broadcast the sorghum mixed with rice. Broadcasting can be a one man job. The technique requires a 'good hand' and some farmers hire someone to do it for them to ensure the seeds are dispersed well over the farm without leaving empty spaces on the plot (Richards, 2016; Interview NF Rev K, 22-10-2016). In comparison to broadcasting, line cropping requires multiple people to make sure the lines are straight and the distance between the seeds are not too large and not too small. The household survey indicates an average farm size of 0.92 hectares. Sowing by hand will take a lot more time in comparison to broadcasting.

The demonstration plots are however an interesting approach to make farmers familiar with new farm methods to increase yields and downsize the amount of work. Van der Ploeg (2012) states that the (subsistence) farmer looks to make the style as efficient as possible. Line cropping would impact the existing style quite much, as it requires the farmer to adapt his/her division of time and tasks because of the different techniques like lining, ridging and thinning. The initial argument that lining is a strenuous time consuming activity makes sense. The repetitive arguments of nucleus farmers for broadcasting are 'tradition' and 'line cropping is time consuming'. However, the natural curiosity of mankind, its opportunism and the farmer's search for efficiency make sense to watch and experience the demonstration plot and try it out on a small scale. This also appears to be the case among a small group of farmers visited during the household survey. Both groups are connected to two different nucleus farmers in Bo district. NF Zulu (Interview, 30-07-2016): "Considering the scale of farming in our area, it is not something they have adopted in large areas, because it takes a lot of energy. We do tell

and encourage the farmers to try all the different forms of cropping to compare the yield and production size.” Indeed in one of the cooperating villages some farmers tell they try line cropping on a small part of the plot (Enumerators Evaluation, 21-10-2016). In a village of the other nucleus farmer in Bo district the farmers got motivated by the higher yields the demonstration plot proved to deliver and bought a long tape measure to try it out themselves for the 2017 season (Observation Bo Bandajuma, 21-10-2016). The motivation of the outgrowing farmers coincide with the positioning of their cooperating nucleus farmers. Both are motivated to experiment with farming techniques, monitor closely, farm themselves and are in close contact with their farmers. As they motivate their farmers to experiment and try for themselves, some actually do.

Other nucleus farmers seem sceptical from the start. An indication for this scepticism is probably the fact that not all nucleus farmers established a demonstration plot for the 2016 season. With 19 nucleus farmers I discussed the maintenance and function of the demonstration plot. Six of the 19 tell they did not establish a demonstration plot in 2016. Four of them give the Ebola epidemic as the reason for it, which is a doubtful explanation. Sierra Leone got declared Ebola free in November 2015 and the project re-launched. This means the nucleus farmer had from December until May (which is six months) to locate and establish a demonstration plot for the 2016 season. A different and more clear reason came from NF Sierra who tells that “The quota is so small that it is not interesting to maintain a demonstration plot. A demonstration plot costs money” (Interview NF Sierra, 02-08-2016). Another nucleus farmers explains that a nucleus farmer gets a 150,000SLL refund to maintain the demonstration plot, which is not enough to take care of it and so the nucleus farmer needs to make a personal investment (Unstructured interview. SA4, 27-10-2016). This could also be a reason not to establish a demonstration plot.

In any case, it seems that the nucleus farmer needs to belief in the potential of a demonstration plot in order for it to reach farmers. Besides the two nucleus farmers in Bo district, two lead farmers of a newly added nucleus farmer in Kailahun tell they established demonstration plots in three different villages (Interview NF Rep Bravo, 28-07-2016). This is one of the nucleus farmer whom is selected based on the new criteria of the recently employed project coordinator: affinity with farming, business savvy and resident of the farming region.

However these criteria do not guarantee a nucleus farmer to cooperate. A different nucleus farmer, active in Kenema district, is both an agronomist and nucleus farmer. During our interview he answered to my question whether he has a demonstration plot: “Yes. I go there every day. (...) bring most of the farmers over to watch it. The farmers respond very positive. (...) When I want to take them to the demonstration plot they always come.” Later, I visited the SLARI high yield variety plots together with the CREATE and SLARI staff. This particular nucleus farmer took care of one of the high yield variety experiment sites and besides this site was his demonstration plot. The plot needed to be pointed out to me because while the crops should reach about 1.30meters high, the plot was practically a dessert. I did not get a chance

to speak with the nucleus farmer again. However, he and other nucleus farmers may have another reason to provide no attention to the demonstration plot besides the initial scepticism towards line cropping. Richards (2016) provides an anecdote that shows the greater social relations that position themselves within the rice farming activities among farmers in village of Mogbuama. Only from an extensive study on the composition of household quarters, he finds the existence of a distinctive group of farm helpers: poorer, older, less strong women or widows who live on a separate part of the quarter as they like to live independently. These women may choose to select off-types during harvesting, sometimes scan for off-types before the rice is threshed and glean the farm for interesting off-types. These off-types are not preferred by the household, for instance because they are more difficult to clean than the main type. The women keep it for personal consumption and/or use the off-types when they like to farm themselves. Because the women don't have the power nor resources to establish their own farm, they may use a previously used plot from a family member. Since the plot's soil is less rich in nutrients, some resistant off-types may still offer sufficient production. Richards: *"what we get from this example is a sense of the manner in which techniques of the body [i.e. panicle harvesting], social organization and food security outcomes are co-produced (pg64-65)."* The social value opens up space for widows and older less strong women to be able to live independently next to their kin. As Van der Ploeg (2012) argues: a farming style is not just the way a farmer works. Subsistence farming is a way of life where work and the social environment are interconnected.

Nucleus farmers are closer related to the outgrowing farmers. This could mean that they have better insight into the farming styles of outgrowers, including the social structures that are incorporated. They may serve as a security link between/for the outgrowers and the CREATE project in terms of risk and pressure management. It may be a bold suggestion, but why would a nucleus farmer invest in teaching line cropping during times of fluctuating demands for sorghum? It may influence the farmers' farming style i.e. livelihood structure while the nucleus farmer is able to reach its quota with minimal restructuring of the existing farming style. Plus, it could be considered a risky undertaking considering 50% of the farmers included in the household survey state they were unable to sell their sorghum at least once between 2013-2015. It makes sense to continue on the safe path and first see how the market develops. The fact that the CREATE project and nucleus farmers do not push or demand a restructure of the farmers' farming style but leave room to the farmers' own preference minimizes pressure on the producers. Offering farmers room to manoeuvre may well be in favour of farmer households' food security.

Another example of the space the project gives to existing farming style concerns its positioning towards the introduction of high yield varieties. In Sierra Leone the CREATE project finds a challenge in increasing the farmers' sorghum yields. In other countries where HEINEKEN and EUCORD started local sourcing projects, the introduction of new crop varieties with high yield potentials are the most successful intervention. For example, in Ethiopia malt barley yields increased from 1.8 to 4.5 ton per hectare due to new varieties combined with

improved practices. Unfortunately for the project in Sierra Leone high yield sorghum varieties are lacking. So far, efforts with SLARI to identify new sorghum varieties have not been very successful. To realize higher yields among farmers the project in Sierra Leone relies at the moment on introducing improved farm practices (Van Aken, 2017). During the visits of the SLARI trial plots in Kenema, Bo and Tonkolili district, the SLARI agronomists and the CREATE staff are reserved towards the four potentially high yield varieties that are tested in 2016 (Participant observations SLARI trial plots 03/04/05-09-2016). The agronomists agree that all four varieties would require additional attention of the farmer in terms of thinning and pest control. Also, they conclude that the varieties would grow better if they would be planted during the dry season instead of the rainy season as they do now. However, the project prefers to link the sorghum production to the existing farm practices, which is mixed cropping with rice sowed in June (at the start of the rainy season). A farmer field day was organized to show nucleus farmers the varieties and interview them about the possible introduction of these varieties to Sierra Leone sorghum farmers (SLARI farmer outing day, 11-11-2016).

Local knowledge

In conversation with chiefs and lead farmers during the survey it appeared that different regions have different responses to threats of damage to sorghum. I started to inform about crop damage prevention after farmers in Bo district mentioned the severe damage to their sorghum by rodents locally known as 'cutting grass'. After analyzing the data coming from the questionnaires it appears that 71% of the surveyed farmers state wildlife damage is problematic while the sorghum is on field. 54% of the surveyed farmers state wildlife damage is problematic after the sorghum is harvested. Most damage is caused by birds and rodents according to the farmers. When the sorghum is on field, 27% of the farmers state birds cause most damage and 57% state rodents cause the most damage to sorghum. After harvesting sorghum, 20% state birds are most problematic and 70% state rodents are (Van Aken, 2017). When farmers face damage caused by wildlife, it can severely impact their yields when they have insufficient knowledge on preventive measures.

Information from Richards (1986) study on rice farmers in Mogbuama learns that bird can indeed negatively impact the yields. Two critical moments are the time during and after sowing and right before harvest, when the kernels are interesting for birds too. Farmers can decide to have someone guard the farms continuously during these times, sometimes staying overnight at the farms in a high build overhead farm shed to be present while the early rising birds become active and are a threat to the farm.

The conversations with (lead) farmers about damage prevention by wildlife is predominantly about rodents. NF Rev K tells: "rodents are the biggest threat to the yield. Most people complain about that. One of the farmers had 75% damage on his farm" (Interview, 30-07-2016). A farmer in Bo district tells rodents ate up 2 bushel (Enumerators Evaluation Bo, 21-10-2016). The sweet taste of sorghum attracts rodents. The basic prevention that seems applied everywhere is fencing and trapping. Additionally there are other measurements. In Bo district there are farmers who hire hunters that use dogs to chase the rodents (Unstructured

interview Lead Farmer Zulu1, 21-10-2016; Interview NF Rev K, 22-10-2016). The lead farmer in Village Zulu2 also tells about one farmer who appears to have four cats to chase of the rodents (Enumerators Evaluation, 21-10-2016). In Kambia district farmers explain that they were taught to burn the strip of land surrounding the farm, as the burned ground appears to scare off the rodents to cross the dead ground (Interview NF Alpha Sierra, 24-10-2016; Unstructured interview Agent S Alpha Sierra, 25-10-2016).

On a different notice, there are also different local practices to determine whether the sorghum is ripe for harvest. One of the applied practices is to crack the sorghum between the teeth. The farmer can hear by the sound the crack produces whether the sorghum is ready for harvest. The project related agronomists however, state that this method is not too sound. The harvest time for sorghum that is meant for brewing is also slightly different from the moment farmers are used to when sorghum is meant as food intake. Therefore, one of the two other techniques come of use, being: 1) crushing the sorghum with the hand. When the sorghum sticks to your hand, it is ready for harvest¹³. 2) when you hear a sound when the sorghum shakes in its kernel (Interview NF Mike, 29-07-2016).

During the pre- and post harvest training sessions nucleus farmers bring one or two lead farmers with them. NF SIK (interview 25-07-2016) tells that every year farmers' skills are updated. NF Lima tells the trainings function also as refreshment, providing the reason that: "Most farmers are not literate. That's why you need to teach every year. Illiterate people forget quickly (Interview NF Lima, 25-07-2016). Since farmers from different districts are brought together for a training day on location, it would be an idea to encourage the dialogue about different local approaches to certain challenges that farmers face related to for example the prevention of crop damage on and off field. During the survey I discussed the knowledge on earlier shared techniques of damage prevention with the following location and it appeared new information to the farmers. As Van Der Ploeg (2013) notes that local knowledge and research on farm methods develop often first and holds important insights because they adapt to the local circumstances already.

Additionally to continue the path of knowledge transfer, it seems that there is a great difference between nucleus farmers' farm groups in received training. Most farmers related to Kenema, Kambia and Kailahun have never visited the demonstration plot, plus some lead farmers have not received training¹⁴. Also, during the SLARI farmer outing day to check farmers' opinions about the HYVs, there were farmers who experienced the day as a holiday and bring a friend or relative rather than a farmer (SLARI farmer outing day, 11-11-2016). On the other hand, the farmers related to for example NF Zulu all received training, working through their Farmer Based Organization (FBO) system (Enumerators Evaluation, 21-10-2016; Unstructured interview LF Zulu1, 21-10-2016).

¹³ Unstructured interview Agent Sierra, 18-10-2016; Unstructured interview Lead Farmer Zulu1, 21-10-2016.

¹⁴ Unstructured interview Agent Sierra, 18-10-2016; Enumerators Evaluation Kailahun. 19-10-2016; Unstructured interview. Agent Kilo. Kenema. 17-10-2016.

Personal observation, confirmed by the former project coordinator (Deters, 2011) indicate that farmers become motivated and feel recognized when you visit and show appreciation. To increase production and give best practices a chance, the project might monitor better who join the project's training sessions. One nucleus farmer suggested to leave the function of facilitating training session with the nucleus farmers instead of investing in expensive gatherings where nucleus farmers from all over the districts join in at a specific location. It however seems that – if the project aims to target positive impact on the outgrowing farmers via the nucleus farmers – some nucleus farmers require some more supervision. Nucleus farmers are seen as independent business partners, even clearly expressed so by SLBL's supply chain manager during our first meeting (Interview NZ, 15-07-2016). Though, to ensure a stable sorghum supply chain when the CREATE project steps out, business training sessions are initiated in 2017 for nucleus farmers to prevent possible future inability of loan repayments for example. Oya (2012) finds a broad spectrum within CF designs ranging from minimum intervention to arrangements that are more designed like an employer-employee system between the buyer-processor (SLBL) and producer (nucleus farmer/outgrowing farmer). Within this particular CF case, the preference lies towards minimal monitoring, but over time provides additional input. It shows that even when minimum interference and monitoring is preferred, it is a challenge to find the right balance when a project intends certain developmental targets. Although the initial start of the sorghum business dates from 2006, the project is in the development phase with a changing economic environment considering the implemented Finance Act by the government, the instalment of the mash filter that is able to process more sorghum and with that, finding methods to increase scale of production that goes along the local farming system.

When you wish farmers' independency and personal control over their livelihood/farming style, you cannot foresee how training and intentions develop. So it comes down to a critical selection of nucleus farmers as business partners who's personal goals and intentions accord to the targets set by the buyer-processor. Field data shows that motivated nucleus farmers, business savvy, personal affinity with farming and contact with outgrowers, intention to provide an income generating activity for their people, providing loans to farmer groups, are all indicators for better inclusion of the outgrowing farmers in the supply chain.

Summarizing this chapter

In theory demonstration plots seem like a good way to introduce outgrowers to new farm methods. As farmers are unlikely to step away from their flexible farm style, the demonstration plots provide a site that shows farmers best practices and the possibility to experiment themselves while not leaving their farming style. Furthermore, the CREATE project tries to adapt its best practices to local practices, by transitioning from mix cropping groundnuts with sorghum to rice with sorghum.

Different regions respond to challenges related to the sorghum market differently. Sharing local coping strategies could favour all. At the moment though, most farmers are not even aware of the existence of demonstration plots. This has to do with both the travelling distance

and the lack of input from the nucleus farmer to introduce farmers to best practices. It's either not in the nucleus farmer personal interest and/or the nucleus farmer is sceptical about the willingness of farmers to adapt their farm styles. Knowledge transfer relies on the nucleus farmer's personal motivation to develop the market, bond with outgrowers and his/her affinity with farming.

Chapter 7: Conclusion

This thesis has tried to provide insights to the extent that the CREATE project provides outgrowing farmers space to manoeuvre by working through nucleus farmers. The CREATE project basically runs its activities through the nucleus farmers. EUCORD tries to take into account local practices and so adapt the introduced best practices. Mostly through demonstration plots and pre-planting and harvest training sessions nucleus farmers are introduced to new farm practices. The project expects nucleus farmers to take up the responsibility of transferring knowledge onto the outgrowing farmers. Considering the range of existing CF schemes and the high amounts of control the initiating party may tend to have, the CF scheme initiated by HEINEKEN and EUCORD relies mostly on the willingness and energy input of their local partners. The CF initiators provide knowledge, the market and try to make sure that they can rely on competent business partners to reach a sustainable value chain once EUCORD steps out of the project after 2019. The development of the scheme is dependent on the positioning of the nucleus farmers. The nucleus farmer basically has complete freedom in designing its work method as long as the sorghum is delivered within the given time frame having the right moisture content. Even though the nucleus farmer is obligated to maintain a demonstration plot and involve outgrowing farmers in its maintenance, not all nucleus farmers do so. Since the project covers 11 out of the 13 country districts, it is difficult to monitor. Aware of its project design, the CREATE staff puts more emphasis on certain characteristics when selecting additional nucleus farmers, such as: the distance between nucleus farmer and outgrowers, if personal motivation is related to the development of their communities and affinity with farming.

Rice cultivation is the major concern for subsistence farmers in Sierra Leone. Besides rice cultivation, farmer households perform different income generating activities. A variety of crops can be grown and people hunt, fish and petty trade. In rural Sierra Leone income generating activities relating to a formal market are however lacking. Sorghum sales to the nucleus farmer provides the household money in bulk. This enables farmers to make an investment that supports the development of the household. Around 70% of the households direct it to paying their children's school fees. Still, farmers do not seem to increase their sorghum production. It is a welcome income to households, but farmers haven't adapted their farming styles to emphasize their labour towards sorghum farming.

The nucleus farmer has a lot of room to manoeuvre. On their turn, nucleus farmers do not pressure outgrowing farmers to adopt best practices. To get involved with sorghum farming, farmers barely have to adjust their farming style other than selecting only the white coloured sorghum. Not pushing best practices in order to increase yields, enables a larger group of outgrowers to get involved. The previous market fluctuations, partly due to the Ebola epidemic, and sometimes lack of communication, result in sales insecurity for farmers. In the high context culture of Sierra Leone it is adamant for farmers to establish good relationships with the nucleus farmer to feel confident to further invest in sorghum farming. Most farmer

households however lack resources to make investments besides the most necessary activities of land preparation, weeding and harvesting. Nucleus farmers providing loans to outgrowing farmers may have a positive influence on the development of farm activities. Sorghum being a resistant crop, broadcasted with rice, is known to always provide. Loan provision is therefore a safe undertaking as farmers' sorghum income will be deducted from the loans. The loan allows the farmer to invest in farming activities the way he/she seems fit and will not risk unwanted debts. The nucleus farmers who have affinity with farming, show to involve lead farmers in maintaining the demonstration plot and encouraging farmers to experiment with the best practices.

Critical academic literature proofs quite sceptical to the overall implementation of Contract Farming initiatives: farmers lose their autonomy, run production risks as they work with unfamiliar crops and techniques and may encounter increased food insecurity. Though securing outgrowing farmers' sales should be given attention, the CREATE project provides a positive counterpart: it provides a substantial income generating activity, which is mostly taking charge by women; through an infant crop; trying to adapt to existing farm practices.

Discussion

Lacking proper baseline data, this research has basically been an exploratory research focussing on the cooperating types of farmers further down the supply chain of the CREATE project. The study mostly finds value by providing indications that could be further explored to make confirmations.

Does the CREATE project put pressure on farmer households' food security

Mentioned as a possible result in academic studies, it is good to go into this question. Besides the Soso people in the northern part of Kambia district, sorghum isn't a preferred food crop. It is an infant crop and security crop. When farmers face a bad year in terms of rice yields, sorghum may support the household's food intake. The Ministry of Agriculture doesn't pay attention to sorghum in its programs to stimulate certain important crops' production and food security programs. This may serve as an indication that sorghum isn't of major importance to households' food intake.

However, the fact that farmers can now market their sorghum production, may result in farmers assigning the sorghum income to a certain function, like taking care of school fees or buying import rice at low price rates. Not all farmers know far in advance whether their production will be sold. The quotas arrive somewhere November at the nucleus farmers. The earliest nucleus farmers start buying sorghum in December and it can take place until March. For farmers with less strong ties with nucleus farmers and their agents to guarantee sales it has been dangerous to assume they receive income from sorghum in the past years of fluctuating demands.

The sorghum market provides interesting opportunities to rural households through potential low risk loans, bulk income, low pressure and farm style adaptations. Being a single buyer market, it can improve its communication along the value chain considering quotas and sales:

providing quotas pre- planting and maybe make an FBO system obligatory to increase farmers' sales secure.

The impulse for farmers to cultivate sorghum may have proven to be helpful during the Ebola epidemic. The number of traders selling food items dropped as farmers were prevented to take care of their plots during the epidemic. Glennerster and Suri's study published in November 2014 states that in Kailahun and Kenema (the first hit districts), there were 69% fewer domestic rice traders than 2012. In later hit areas there were at the same time 29% fewer domestic rice traders (Glennerster and Suri, 2014). Travel restrictions may have prevented farm activities; people might have been afraid to work in labour groups; the epidemic may have deregulated the household. Without proper care of the farm, rice yields would've depleted. Sorghum being a resistant crop may have proven a solution. In comparison to 77% in 2013, 92% of the households consumed the sorghum available for consumption in 2015. I think it would be safe to say that – even though as a by product – the CREATE project's impulse to sorghum cultivation has contributed to food security during the Ebola epidemic. Mind that not all CREATE project farmers incorporated sorghum on their farms before there was a possibility to market it.

The sorghum market has opened the possibility for farmers to take loans safely at either the VSL or with the nucleus farmer. The nucleus farmer will deduct the loan from the income a farmer collects through sorghum production. Taking a loan at the VSL may be more risky depending on whether the farmer's sales of production is guaranteed. When a farmer is incorporated with an FBO that runs the sorghum sales and is connected to the VSL, the risk seems low. Otherwise the farmer may run the risk of being in debt with the VSL. Indirectly this can affect a household's food security. The household may not be able to get a loan for next season's cultivation, which pressures the likelihood of high yields, while resolving the debt may go through selling part of its next rice harvest. The patronage system may prove as a solution, but commits the farmer to another future obligation. In this light, it is not surprising that nucleus farmers' faced the challenge of keeping their cooperating farmers motivated during the time of fluctuating quotas. Additionally, considering the common situation of being resource poor and lacking sufficient labour to take care of farm/household activities, farmers may have wanted to direct their energy differently when they received timely information on their ability to sell sorghum. So depending on a farmer's sales security, the sorghum market may provide a possible way out of the poverty cycle.

Future development

Richards (1986) states that farm activities and social relations are interconnected. Similarly, Van der Ploeg (2012) tells that subsistence farming is a way of life where work and the social environment are interconnected. A possible result of a CF initiative that demands farmers to readjust their farm style, are disputes within the farmer household. As contracts usually run through men while women take up the farming activities, or because men shift focus towards the cash crop while leaving out important crops for consumption (Kirsten and Sartorius, 2002). The CREATE project allows farmers to continue with their existing farm style and women are

allowed to keep their income from sorghum. The question is how this will develop itself in the future. SLBL is able to process three times the amount of sorghum since the mash filter instalment during the last quarter of 2016 and the Finance Act raises import taxes of competing brands. Can nucleus farmers meet future demands with their current farm groups and by adding farmers or will CREATE push their initiative towards production increase? Think of HYVs, promoting line cropping shown through demonstration plots more heavily and/or location optimization in order to improve monitoring capabilities?

SLARI's research on HYVs may provide a solution. So far CREATE is careful in evaluating sorghum varieties suitable to the current farm cycles and behaviour in Sierra Leone, for example: the HYVs tested in 2016 prove to increase yields but require significantly more attention when planted right before the rain season together with rice as is the common practice. Here again the project proves to take into account context specifics and is reluctant towards introducing one of these varieties, aware that resource poor farmers are reluctant to implement labour intensive techniques. So the HYV research continues.

After two years of including mixed cropping of sorghum with groundnuts on the demonstration plots, the project switched to mixing sorghum with rice like farmers practice themselves. Unfortunately the Ebola epidemic erupted. After re-launching the project CREATE focussed mostly on securing the established progression and preparing for the expected demand increase after the instalment of the mash filter by including new nucleus farmers. The nucleus farmers and outgrowing farmers are provided with a lot of room to decide their work method for themselves and the role and importance they assign to learning new techniques through the demonstration plots. For CREATE this will be a mixed decision between adapting to local context and just necessary, since the project includes farmers from 11 out of 13 districts. In their review article, Kirsten and Sartorius mention 'location optimization' as a success factor for CF schemes. CREATE would be able to monitor the activities more closely. My estimation would be that location optimization would mean that its approach would likely change in the direction of including large scale production partners and yield optimization among participating farmers. This would on its turn affect farmers' room for manoeuvre considering their farming style. Disadvantages for farmers related to CF mentioned by academics are then more likely to arise, such as: loss of autonomy by increased monitoring and requirements; production risks related to non-traditional farm technologies; higher levels of family conflict because of increased concentration of production. However, in the near future these disadvantages seem unlikely to develop in practice. For now the CREATE project develops itself through the trend of acknowledging context specifics and the goal to provide an income generating activity to rural Sierra Leone. Therewith it seems to provide a case that counter signals previous case studies on CF in practice and shows the road to establishing a CF initiative as a development tool for African subsistence farmers is possible.

Contract farming in Sub Saharan Africa the way to go?

This research presents a middle way between the critique presented by academic literature and the excitement of the World Bank, all basically circled around the question: “is Contract Farming as a market led solution the way to go when trying to provide farmers a way out of the poverty cycle?” Previously, Kirsten and Sartorius (2002) or Oya (2012) already expressed it is difficult to make generalizations concerning CF because of the diverse designs and contexts where CF initiatives are implemented. Isager et al (xxx) try to show with their study zooming in on the involved Farmer Organization that the profile of specific FO members also show to have influence on farmers’ income security related to the outgrower scheme, for example because of the practice of favouritism.

Additionally to these insights, this case study on the sorghum value chain in Sierra Leone shows with the guidance of both Richards and Van der Ploeg that the actions and directions of the initiator (usually the buyer-processor), impact the farming operations and therewith the social relations of the farming households. It depends on the contextual considerations of the initiator to what extent the farmer households are able to gradually adapt their farming style to the requirements of the CF scheme. In this specific CF initiative it is not only the buyer-processor but also the nucleus farmer as intermediary that are of additional influence to the consequences the CF scheme may have for farmer households. Because the impact and outcome of a CF scheme on farmer households in Sierra Leone is so dependent on the initiating parties involved, the question can be asked whether broader implementation of Contract Farming is recommendable.

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Interview NF Yankee. Tonkolili. 26-07-2016.
Interview NF SA4. Tonkolili. 27-07-2016.
Interview NF Brother Alpha. Mile 91. 27-07-2016.
Interview NF Rep Bravo. Kailahun. 28-07-2016.
Interview NF Mike. Kenema. 29-07-2016.
Interview NF Sister. Kenema. 29-07-2016.
Interview NF India. Kono. 29-07-2016.
Interview NF Rev K. Bo. 30-07-2016.
Interview NF Echo. Kenema. 30-07-2016.
Interview NF Zulu. Bo. 30-07-2016.
Interview NF Sierra. Freetown. 02-08-2016.
Interview NF YW. Freetown. 02-08-2016.
Interview NF Hotel. Freetown. 02-08-2016.
Interview NF Alpha Kilo. Freetown. 02-08-2016.
Interview NF Kilo. Kenema. 16-10-2016.
Interview NF Foxtrot Kilo. Kambia. 24-10-2016.
Interview NF Alpha Sierra. Kambia. 24-10-2016.
Interview NF Rev K. Bo. 22-10-2016.

Unstructured interviews

Unstructured interview. Project Coordinator. Freetown. 14-07-2016.
Unstructured interview. Agronomist Foxtrot. Yele. 03-08-2016.
Unstructured interview. Sub-contractor Yele. Yele. 20-09-2016.
Unstructured interview. Agent Kilo. Kenema. 17-10-2016.
Unstructured interview. Agent Sierra. Kailahun. 18/19/20-10-2016.
Unstructured interview. Lead Farmer Zulu1. Bo. 21-10-2016.
Unstructured interview. Farmer Zulu2. Bo. 21-10-2016.
Unstructured interview. Secretary Foxtrot Kilo. 25-10-2016.
Unstructured interview. Agent S Alpha Sierra. 25-10-2016.
Unstructured interview. SA4. Tonkolili. 27-10-2016.
Unstructured interview. Brother Alpha. Moyamba. 28-10-2016.
Unstructured interview. Bossman President. Yele. 29-10-2016.

Participant observations

SLARI trial plots. Blama. 03-09-2016.

SLARI trial plots. Bandajuma. 04-09-2016.

SLARI trial plots. Yele. 05-09-2016.

SLARI farmer outing day. Yele. 11-11-2016.

Bo Bandajuma. 21-10-2016.

Half-Annual Steering Committee Meeting. 09-12-2016.

Survey Questionnaire

Enumerators Evaluation Kailahun. 19-10-2016.

Enumerators Evaluation Bo. 21-10-2016.

Appendix 1 - Household survey locations

The numbers indicated in Table 9 in front of the villages show the location of the village on Picture 4 and Picture 5. Picture 3 will show a full overview of the visited villages on the map of Sierra Leone.

Table 9. Overview of visited villages

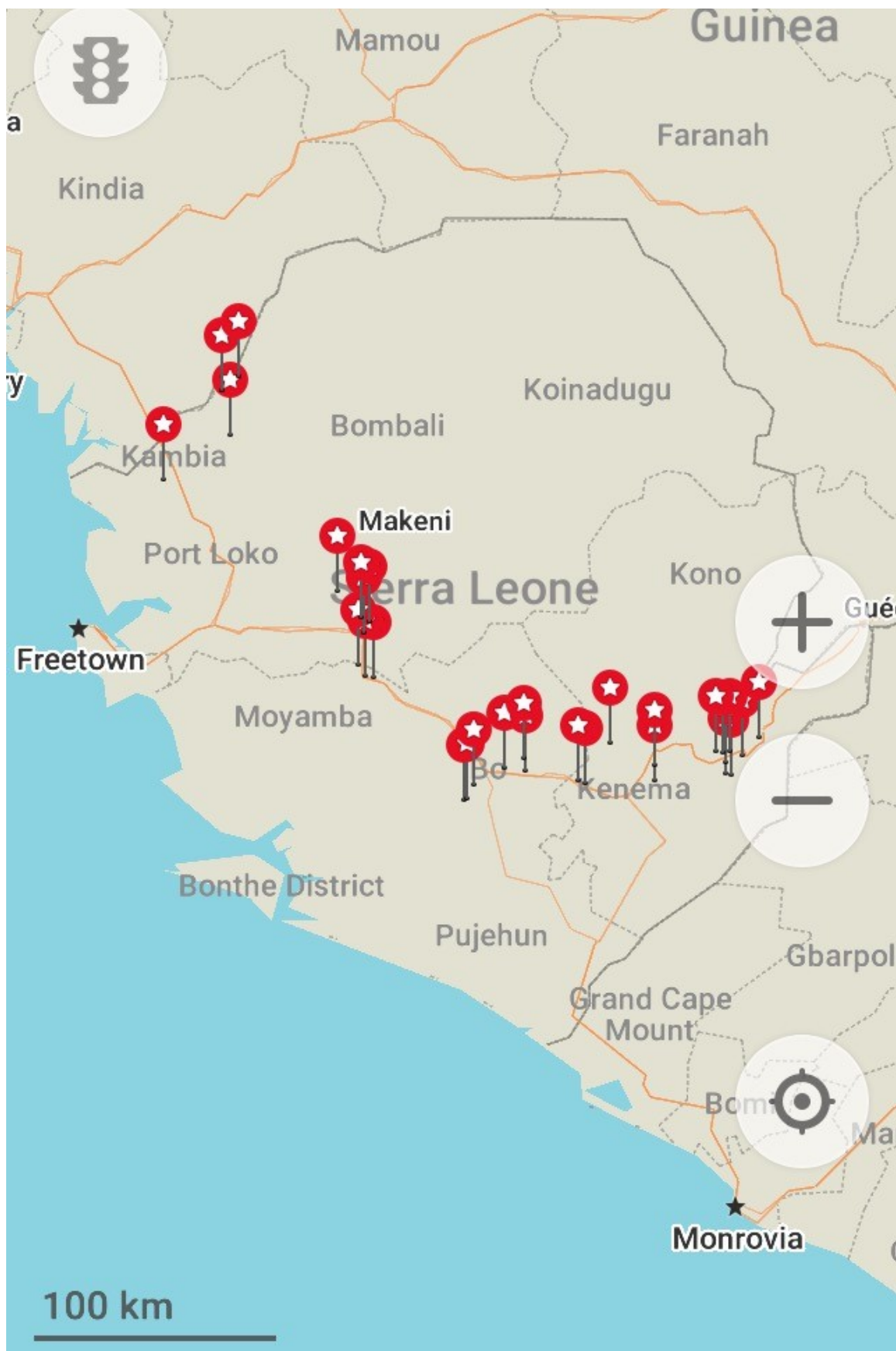
Village	Section	Chiefdom	District
(12) Bandajuma	Nyallay	Kakua	Bo
(13) Falu	Korgeh	Kakua	Bo
(14) Fengehun	Nyawa	Kakua	Bo
(15) Gbalehun	Sewa	Tikonko	Bo
(16) Kassama	Mabana	Tikonko	Bo
(17) Morkumba	Niagbla	Tikonko	Bo
(18) Tikonko	Sewa	Tikonko	Bo
(24) Benduma	Sowa	Jawie	Kailahun
(25) Bomborhun	Sowa	Jawie	Kailahun
(26) Kortuma	Mano	Jawie	Kailahun
(27) Malema	Upper niawa	Jalahun	Kailahun
(28) Mamboma	Kimaya	Jalahun	Kailahun
(29) Poturu	Upper Kuvia	Mandu	Kailahun
(30) Tikonko	Lower Kuvia	Mandy	Kailahun
(31) Tondola	Sei	Jalahun	Kailahun
(1) Gbulun	Kanku Briamiah	Briamiah	Kambia
(2) Katherine	Mamakoh	Tonko Limba	Kambia
(3) Kukuna	Kukuna	Briamiah	Kambia
(4) Rokupr ¹⁵	-	Magbema	Kambia
(19) Gelehun	Sowa	Small Bo	Kenema

¹⁵ The farmers interviewed in Rokupr are not included in the survey results because of the test day held there.

(20) Konabu	Dagbanya	Nongowa	Kenema
(21) Longema	Sowa	Small Bo	Kenema
(22) Njagbema	Sani	Kandu Leppiama	Kenema
(23) Nyanyahyn	Kona Kpindibu	Nongowa	Kenema
(9) Bailagor	Balorgor	Kori	Moyamba
(10) Bunubu	Bailargo	Kori	Moyamba
(11) Moyamba Junction	Tondambalanga	Fukunyia	Moyamba
(5) Grandama	Grandama	Yoni	Tonkolili
(6) Masugbai	Makoba	Malalmara	Tonkolili
(7) Matati	Yoni	Yoni	Tonkolili
(8) Mathinkalor	Marunia Sako	Kaholifa Mubang	Tonkolili

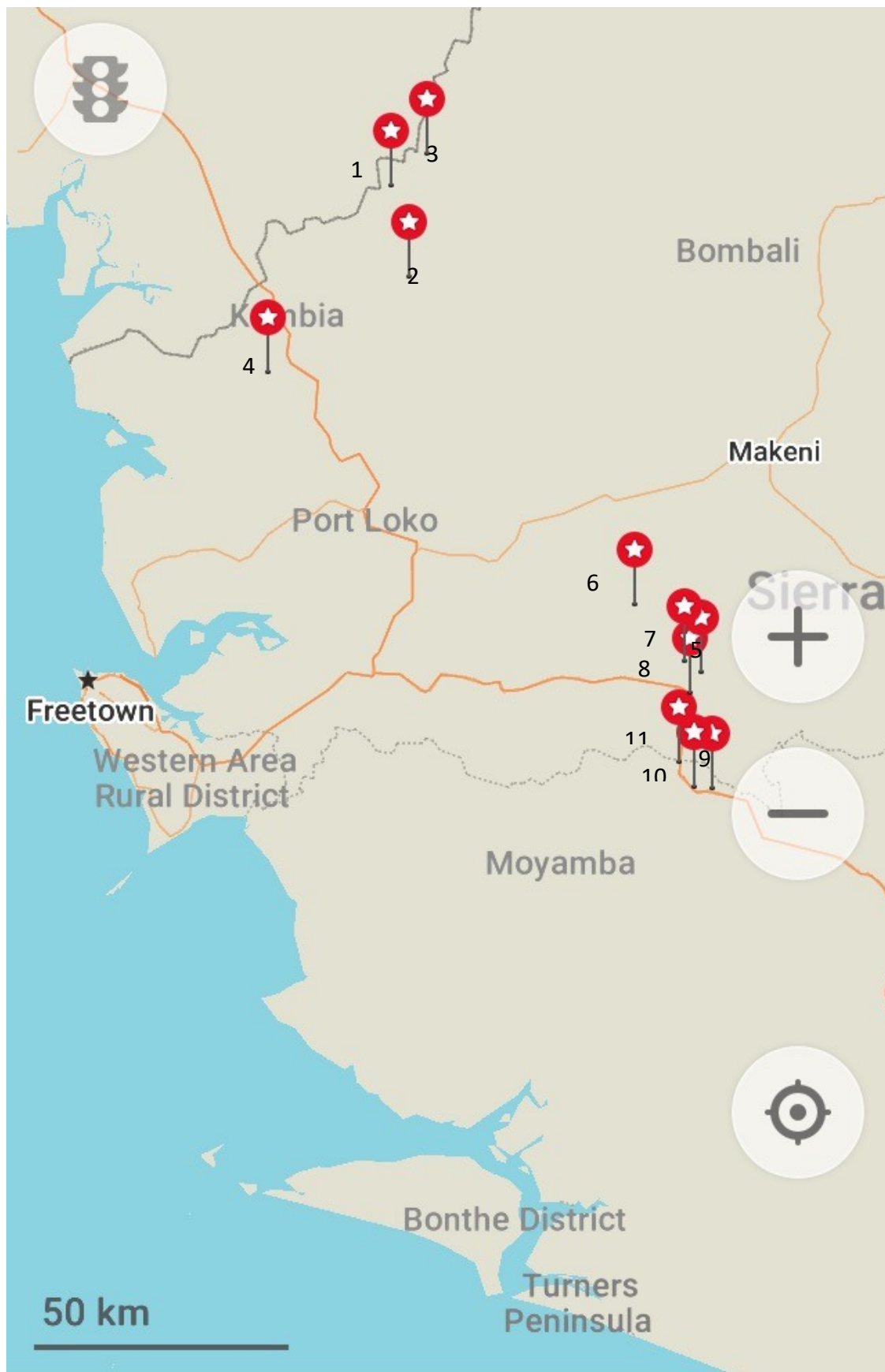
(source: own survey)

Picture 3. Survey locations on the full Sierra Leone map



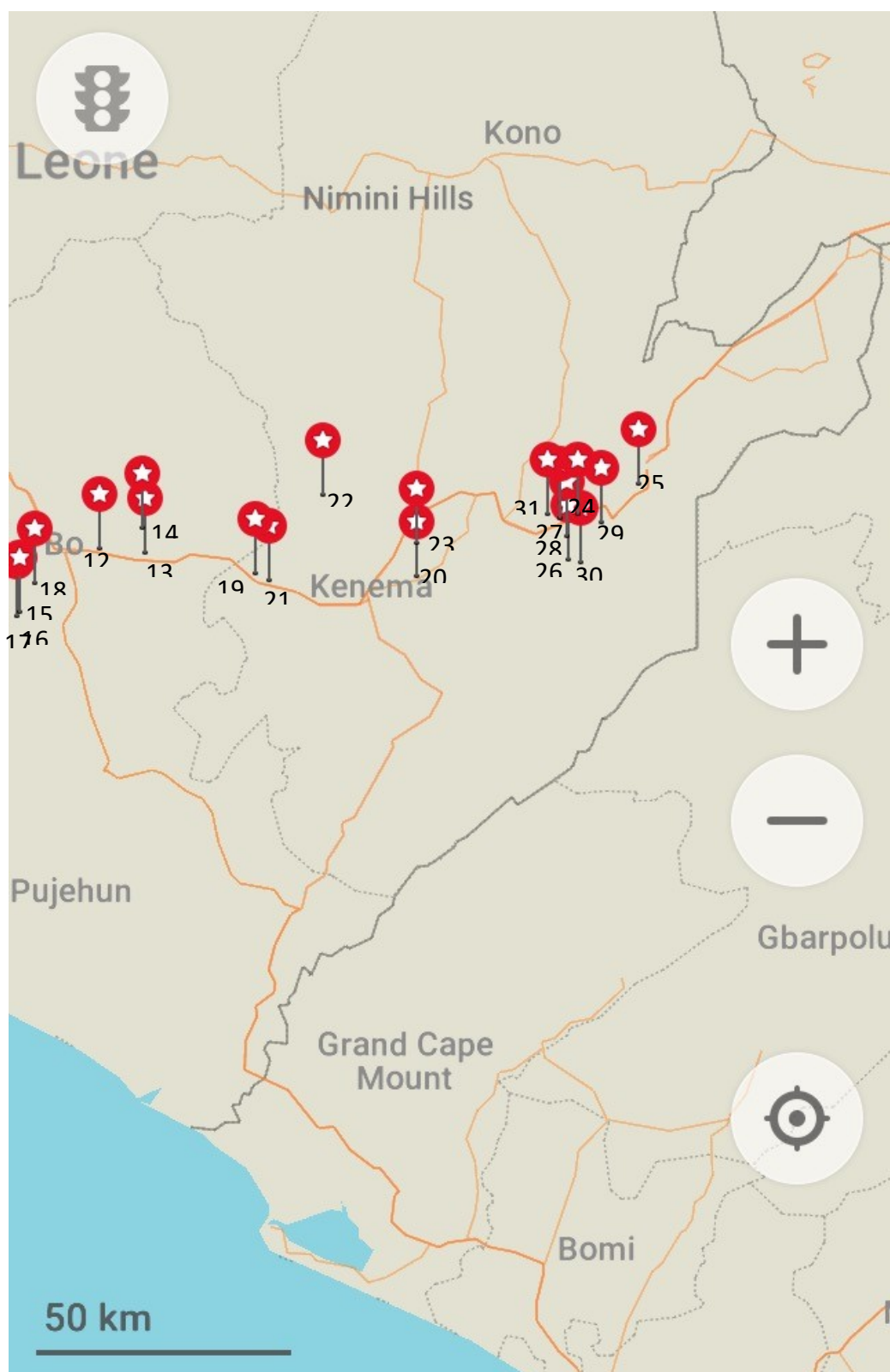
Source: maps.me

Picture 4. Survey locations zoomed into the Northern Region (Kambia, Tonkolili, Moyamba)



Source: maps.me

Picture 5. Survey locations zoomed into the South/South-East Region (Bo, Kenema, Kailahun)



Source: maps.me

Appendix 2 – Household Questionnaire & Informed consent

Personal information

Name: _____

Gender: ☐ Male ☐ Female

Year of birth: _____

Village: _____

Section: _____

Chieftdom: _____

District: _____

Enumerator

Day

Time

Location

What year did you start selling sorghum to the trader: _____

Food security

PPI

Question

1. How many members does the household have?

2. Are all household members ages 6 to 13 in school now?

Response options

(Only mark either A, B, C, D or E)

- A. ☐ Ten or more
B. ☐ Seven, eight or nine
C. ☐ Six
D. ☐ Five
E. ☐ Four
☐ One, two or three
A. ☐ No
B. ☐ Yes / No one aged 6 to 13

3. What was the activity of the female head/wife in her main occupation in the past 12 months?
- A. ☐ No female head/wife
 B. ☐ Agriculture, forestry, mining, or quarrying
 C. ☐ Other / does not work
4. How many common rooms + sleeping rooms does the household occupy?
- A. ☐ One
 B. ☐ Two
 C. ☐ Three or more
5. What is the main flooring material of the house?
- A. ☐ Earth/Mud
 B. ☐ Cement /Concrete
6. What is the main construction material of the outside walls?
- A. ☐ Stone/Burnt bricks
 B. ☐ Mud/Mud bricks, or wood
 C. ☐ Cement/Sandcrete or Zinc
7. What type of toilet does the household use?
- A. ☐ Bush/River, none, other
 B. ☐ Bucket, common pit, VIP (ventilated improved pit)
 C. ☐ Private pit, Common flush, Flush toilet
8. What is the main source of lighting for the dwelling?
- A. ☐ Generator, Kerosene, Gas lamp, candles, torch light,
 B. ☐ Electricity
9. What is the main fuel used by the household for cooking?
- A. ☐ Wood, or other
 B. ☐ Charcoal
 C. ☐ Gas, Kerosene, Electricity
10. How many radios, radio cassettes or mp3 players (*mostly memory card holding players*) do members of the household own?
- A. ☐ None
 B. ☐ One
 C. ☐ Two or more

HFIAS

Question	Response options
1. In the past four weeks, did you worry that your household would not have enough food?	<input type="checkbox"/> 0 = No <input type="checkbox"/> 1 = Yes
1.a How often did this happen?	<input type="checkbox"/> 1 = Rarely (once or twice in the past four weeks) <input type="checkbox"/> 2 = Sometimes (three to ten times in the past four weeks) <input type="checkbox"/> 3 = Often (more than ten times in the past four weeks)
2. In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	<input type="checkbox"/> 0 = No <input type="checkbox"/> 1 = Yes
2.a How often did this happen?	<input type="checkbox"/> 1 = Rarely (once or twice in the past four weeks) <input type="checkbox"/> 2 = Sometimes (three to ten times in the past four weeks) <input type="checkbox"/> 3 = Often (more than ten times in the past four weeks)
3. In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	<input type="checkbox"/> 0 = No <input type="checkbox"/> 1 = Yes
3.a How often did this happen?	<input type="checkbox"/> 1 = Rarely (once or twice in the past four weeks) <input type="checkbox"/> 2 = Sometimes (three to ten times in the past four weeks) <input type="checkbox"/> 3 = Often (more than ten times in the past four weeks)
4. In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	<input type="checkbox"/> 0 = No <input type="checkbox"/> 1 = Yes
4.a How often did this happen?	<input type="checkbox"/> 1 = Rarely (once or twice in the past four weeks) <input type="checkbox"/> 2 = Sometimes (three to ten times in the past four weeks) <input type="checkbox"/> 3 = Often (more than ten times in the past four weeks)

5. In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food? ☐0 = No ☐1 = Yes
- 5.a How often did this happen? ☐1 = Rarely (once or twice in the past four weeks)
☐2 = Sometimes (three to ten times in the past four weeks)
☐3 = Often (more than ten times in the past four weeks)
6. In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food? ☐0 = No ☐1 = Yes
- 6.a How often did this happen? ☐1 = Rarely (once or twice in the past four weeks)
☐2 = Sometimes (three to ten times in the past four weeks)
☐3 = Often (more than ten times in the past four weeks)
7. In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food? ☐0 = No ☐1 = Yes
- 7.a How often did this happen? ☐1 = Rarely (once or twice in the past four weeks)
☐2 = Sometimes (three to ten times in the past four weeks)
☐3 = Often (more than ten times in the past four weeks)
8. In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food? ☐0 = No ☐1 = Yes
- 8.a How often did this happen? ☐1 = Rarely (once or twice in the past four weeks)
☐2 = Sometimes (three to ten times in the past four weeks)
☐3 = Often (more than ten times in the past four weeks)
9. In the past four weeks, did you or any other household member go a whole day and night without eating anything ☐0 = No

because there was not enough food? ☐ 1 = Yes

9.a How often did this happen? ☐ 1 = Rarely (once or twice in the past four weeks)

☐ 2 = Sometimes (three to ten times in the past four weeks)

☐ 3 = Often (more than ten times in the past four weeks)

Farming

Q1.	Main income generating crops in order of importance	Number of household members involved in cultivation	How many times per year do you harvest?	How much produce of the previous harvest did you sell?	Unit	At what price did you sell the produce the last time? Leones/Unit
1	_____	_____	_____	_____	_____	_____
2	_____	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____	_____
5	_____	_____	_____	_____	_____	_____

Q.2 Size of the present sorghum farm in acres: _____ acres

Q.3 Do you grow other crops together with sorghum on the same farm? 1. ☐ Yes 2. ☐ No

If yes, what are the main important crops? 1. _____ 2. _____ 3. _____

Q.4 Did you increase the farm size when you started delivering sorghum to the trader?

1. ☐ Yes 2. ☐ No

If yes, what was the previous farm size: _____ acres.

Q.5 Did you stop cultivating other crops for the cultivation of sorghum? 1. ☐ Yes 2. ☐ No

If yes, what crops did you stop cultivating because of sorghum?

1. _____ 2. _____ 3. _____

Q.6 How much sorghum do you sow on the farm? _____ unit: _____

Q.7 Did you increase the amount of sorghum you are growing since delivering sorghum to the trader? 1. ☐ Yes 2. ☐ No

If yes, the amount of sorghum you previously sow on the farm: _____ unit: _____

Q.8 How many household members are involved in sorghum farming? _____

Q.9 How many days per week do you or your household members engage in this activity?

_____ days per week.

Q.10 How many people that do not belong to your household are engaged/employed in this activity?
_____ people.

Q.11 How many days per week do non-household members engage in this activity?

_____ days per week.

Education

Q.1 Level of education	Number of adults in the household (18≥): _____	Number of children in the household (0-17): _____
No education		
Some primary education		
Completed primary education		
Some secondary education		
Completed secondary education		
Higher education		
Arabic School		

Q.2 How many children are going to school at the moment? _____ children

If children go to school, do they go to ☐ Primary ☐ Secondary ☐ Higher education

Production

Q.1 In what year did you deliver sorghum to the trader?

☐ 2013 ☐ 2014 ☐ 2015

Q.2 What was the quantity of sorghum that you *produced* in the following year?

2013: _____ Unit: _____

2014: _____ Unit: _____

2015: _____ Unit: _____

Q.3 What was the quantity of sorghum that you *sold* to the trader in the following year?

2013: _____ Unit: _____

2014: _____ Unit: _____

2015: _____ Unit: _____

Q.4 How much sorghum were you not able to sell to the trader in the following year?

2013: _____ Unit: _____

2014: _____ Unit: _____

2015: _____ Unit: _____

Q.5 How much sorghum did you sell on the local market in the following year?

2013: _____ Unit: _____

2014: _____ Unit: _____

2015: _____ Unit: _____

Q.6 How much sorghum did your household consume in the following year?

2013: _____ Unit: _____

2014: _____ Unit: _____

2015: _____ Unit: _____

Q.7 Did you get the same price per bag (or other measurement) every year from the nucleus farmer?

1. ☐ Yes 2. ☐ No

If no, what is the reason?

Q.8 Do you reserve a certain quantity of sorghum for the next planting season?

1. ☐ Yes 2. ☐ No

If yes, how much sorghum do you reserve? _____

Income

Q.1 How much income did you generate by selling sorghum in the following year?

2013: _____ Leones

2014: _____ Leones

2015: _____ Leones

Q.2 How did you spend the income generated from selling sorghum to the trader in the following year?		
2013	2014	2015

Examples of answers: Food, Tools, Agricultural inputs, Debt payment, School Fees, Water well, Roof, House, Motorcycle, Health Care, Other investments (these options are not exhaustive)

Q.3 After receiving sorghum income from the trader:

Meals per day of the household

- ☐ Lowered
- ☐ Stayed the same
- ☐ Increased

The size of the meals

- ☐ Lowered
- ☐ Stayed the same
- ☐ Increased

The food variety the household ate

- ☐ Lowered
- ☐ Stayed the same
- ☐ Increased

Q.4 Are you able to make investments with the sorghum income, which you couldn't realise before?

1. ☐ Yes 2. ☐ No

If yes, what are these investments? _____

Q.5 Do you decide yourself how you spend the money earned by the sorghum?

1. ☐ Yes 2. ☐ No

Q.6 Do you need to discuss with your partner how you spend the income from sorghum?

1. ☐ Yes 2. ☐ No

Sorghum Damages

Question	Answer Pre-Harvest	Answer Post-Harvest	Answer indication
Q.1 Did you experience any theft of sorghum crops this past season (2015)?	1. <input type="checkbox"/> None 2. <input type="checkbox"/> A little problem 3. <input type="checkbox"/> A problem 4. <input type="checkbox"/> A big problem	1. <input type="checkbox"/> None 2. <input type="checkbox"/> A little problem 3. <input type="checkbox"/> A problem 4. <input type="checkbox"/> A big problem	1 = No problem 2 = Manageable problem 3 = Outside intervention needed 4 = Problem beyond management capabilities
Q.2 How big of a problem was sorghum crop damage from wildlife this past season (2015)?	1. <input type="checkbox"/> None 2. <input type="checkbox"/> A little problem 3. <input type="checkbox"/> A problem 4. <input type="checkbox"/> A big problem	1. <input type="checkbox"/> None 2. <input type="checkbox"/> A little problem 3. <input type="checkbox"/> A problem 4. <input type="checkbox"/> A big problem	1 = No problem 2 = Manageable problem 3 = Outside intervention needed 4 = Problem beyond management capabilities
Q.3 What animals cause the most damage to your sorghum crops?	1. <input type="checkbox"/> Birds 2. <input type="checkbox"/> Rodents 3. <input type="checkbox"/> Insects 4. <input type="checkbox"/> Monkeys 5. <input type="checkbox"/> Other (specify): _____	1. <input type="checkbox"/> Birds 2. <input type="checkbox"/> Rodents 3. <input type="checkbox"/> Insects 4. <input type="checkbox"/> Monkeys 5. <input type="checkbox"/> Other (specify): _____	

<p>Q.4 Please rank the following issues in order from biggest problem to smallest problem that you experienced this past year (2015):</p> <p><i>In the space provided to the right "1" = biggest problem and "5" = smallest problem</i></p>	<p>A. Not enough sorghum seed</p> <p>B. Crop damage wildlife</p> <p>C. Theft of crops</p> <p>D. Too little labour</p> <p>E. Too little land available</p>	<p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p>
---	---	---

Distance

Q.1 What is the distance from your house to the sorghum farm? _____Miles

Q.2 What is the distance from your sorghum farm to the local collection point? ____Miles

Q.3 What is the distance from your house to the nearest PHU? _____Miles

Q.4 What is the distance from your house to the nearest pharmacy? _____Miles

Q.5 What is the distance from your house to the primary school? _____Miles

Q.6 What is the distance from your house to the secondary school? _____Miles

Q.7 What is the distance from your house to Arabic school? _____Miles

Production costs

Q.1 What type of transportation do you use to carry the sorghum from the farm to the local collection point (*more answers possible*)?

- ☐Foot ☐Motorcycle ☐Tractor ☐Car ☐Wheelbarrow
☐Bicycle ☐The trader carries the sorghum ☐Other, namely _____

Q.2 How much money did the transportation to and from the sorghum farm cost you the past four weeks? _____ Leones

Q.3 How are these costs divided over the following activities?

- | | |
|---|--|
| <input type="checkbox"/> Land-clearing | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Planting | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Thinning | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Weeding | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Fencing | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Ridging | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Harvesting | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Threshing | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Winnowing | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Transport | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Human guards | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Other, namely: _____ | Costs for tasks and food: _____ Leones |
| <input type="checkbox"/> Other, namely: _____ | Costs for tasks and food: _____ Leones |

Q.4 What are the annual costs for growing sorghum in 2015? _____ Leones

Q.5 Do you use paid labour to help on the sorghum farm? 1. ☐ Yes 2. ☐ No

If yes, for which of the following tasks do you use paid labour in 2015 for sorghum?

- | | |
|---|---|
| <input type="checkbox"/> Land-clearing | Costs for tasks and food provided: _____ Leones |
| <input type="checkbox"/> Planting | Costs for tasks and food provided: _____ Leones |
| <input type="checkbox"/> Thinning | Costs for tasks and food provided: _____ Leones |
| <input type="checkbox"/> Weeding | Costs for tasks and food provided: _____ Leones |
| <input type="checkbox"/> Fencing | Costs for tasks and food provided: _____ Leones |
| <input type="checkbox"/> Ridging | Costs for tasks and food provided: _____ Leones |
| <input type="checkbox"/> Harvesting | Costs for tasks and food provided: _____ Leones |
| <input type="checkbox"/> Threshing | Costs for tasks and food provided: _____ Leones |
| <input type="checkbox"/> Winnowing | Costs for tasks and food provided: _____ Leones |
| <input type="checkbox"/> Transport | Costs for tasks and food provided: _____ Leones |
| <input type="checkbox"/> Human guards | Costs for tasks and food provided: _____ Leones |
| <input type="checkbox"/> Other, namely: _____ | Costs: _____ Leones |
| <input type="checkbox"/> Other, namely: _____ | Costs: _____ Leones |

If yes, what are the annual costs for paid labour in 2015? _____ Leones

Q.6 Do you own the farmland? 1. ☐ Yes 2. ☐ No (*If 'Yes', skip question 7*)

Q.7 Do you have to pay a lease for your farmland? 1. ☐ Yes 2. ☐ No

If yes, how much did you have to pay last year? _____ Leones

If no, what do you give other than money? _____

Support

Q.1	Did you receive training on sorghum farming?	<input type="checkbox"/> Yes <input type="checkbox"/> No → jump to next question
1.a	If yes, who provides training?	<input type="checkbox"/> Lead farmers <input type="checkbox"/> Trader <input type="checkbox"/> Nucleus farmer <input type="checkbox"/> Ministry of Agriculture <input type="checkbox"/> NGO, name: _____ <input type="checkbox"/> other: _____
1.b	In what activities do you receive training/assistance:	<input type="checkbox"/> Improved intercropping <input type="checkbox"/> Improved drainage <input type="checkbox"/> Weeding <input type="checkbox"/> Harvesting <input type="checkbox"/> Fertilization <input type="checkbox"/> Pest control <input type="checkbox"/> Seed preservation <input type="checkbox"/> Other: _____

Q.2 Do you make use of a loan to be able to farm sorghum? 1. ☐ Yes 2. ☐ No

If yes, where do you get the loan? _____

How much is the loan? _____ Leones

How did you use the loan? _____

If no, how do you get fund for farming?

Q.3	Do you receive additional support to	<input type="checkbox"/> Yes <input type="checkbox"/> No	
-----	--------------------------------------	---	--

	improve your ability to deliver good work?		
3.a	If yes, what kind of support do you receive?	<input type="checkbox"/> Skills training <input type="checkbox"/> Financial support <input type="checkbox"/> Schooling <input type="checkbox"/> Farm material <input type="checkbox"/> Food for work <input type="checkbox"/> Medicine <input type="checkbox"/> Other	Name of providing institution / Person (specify type of association) <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Q.4	Do you have any debts or loans at the moment for farming activities?	1. <input type="checkbox"/> Yes 2. <input type="checkbox"/> No
4.a	If yes, with whom do you have an outstanding debt/loan at the moment?	<input type="checkbox"/> Bank <hr/> <input type="checkbox"/> Cooperative <input type="checkbox"/> Sorghum trader <input type="checkbox"/> Family member/acquaintance <input type="checkbox"/> Institution/Organization <hr/> <input type="checkbox"/> Other: _____
4.b	What do you use the loan for?	<input type="checkbox"/> Tools <input type="checkbox"/> Food <input type="checkbox"/> Education <input type="checkbox"/> Health care <input type="checkbox"/> Paid Labour <input type="checkbox"/> Buying agricultural inputs <input type="checkbox"/> Fencing <input type="checkbox"/> Transport <input type="checkbox"/> Other _____

Q.5 Have you visited the sorghum demonstration plot of the nucleus farmer?

1. ☐ Yes 2. ☐ No

If yes, how often do you visit the demonstration plot?

☐ once in total ☐ one time per season ☐ two times per season ☐ monthly

☐ weekly ☐ daily ☐ other, namely: _____

Satisfaction

Q.1 On a scale from 1 to 5, how satisfied are you with the sorghum business?

☐ 1 (very unsatisfied) ☐ 2 (unsatisfied) ☐ 3 (neutral) ☐ 4 (satisfied) ☐ 5 (very satisfied)

Q.2 What impact has the sorghum project on you and your family's life?

We thank you very much for your time and cooperation to this questionnaire.

Informed Consent

Give the informed consent form to the participant and talk it through with them

My name is _____. I am a research associate hired by the CREATE project on sorghum production. I am here to conduct a survey on sorghum farming. Before we begin, I would like to take a minute to explain why I am inviting you to participate and what I will be doing with the information you provide to me: feel free to stop me at any point if you have questions. After the brief explanation about the project you can decide whether you will like to participate.

Participation is voluntary and would last for about one hour. The information you give is confidential and will not be exposed or shared with any other people besides the officials from the CREATE project. If at any time for any reason you would prefer not to answer any questions, please feel free not to.

If you have any questions later you can contact the research coordinator/or supervisor on 079970032 or 076898500.

Name of research coordinator:

Name of research participant:

Rutger van Aken

CREATE Project

Signature:

Signature:

Date: _____

Date: _____