



MINISTRY OF DEVOLUTION AND PLANNING

### Instruments for Devolution Advice and Support (IDEAS)

CENTRAL OPERATIONS GLOBAL/INDIVIDUAL FINANCIAL/BUDGETARY COMMITMENT NO: KE/FED/024230

# CAMEL MEAT VALUE CHAIN ANALYSIS AND FEASBILITY STUDY – WAJIR COUNTY

[Supporting the responsible transfer and use of resources for the achievement of Local Economic Development (LED) at County level]

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[FINAL REPORT SUBMITTED ON 26TH MAY 2017]



## **DISCLAIMER:**

The content of this report is the sole responsibility of the Consultant and cannot be taken to represent the point of view of the Government of Kenya, the County Government of Wajir, and the Delegation of the European Union in Kenya, Eurecna or other stakeholders.

### **EXECUTIVE** SUMMARY

The report details the findings of a camel meat sector value chain analysis and feasibility study carried out in Wajir County between 27<sup>th</sup> March and 5<sup>th</sup> May 2017. The assignment was commissioned by the Instruments for Devolution Advice and Support (IDEAS) programme which is being implemented jointly by the European Union (EU) and the Ministry of Devolution and Planning (MoDP). The IDEAS programme is offering grants of 110 million Kenya Shillings to 15 selected Counties in Kenya. Wajir County has proposed to invest 34.1 % (approximately 37 million Kshs.) of this grant to set up a Common Manufacturing Facility (CMF) that has an inbuilt slaughter slab. The CMF unit will be used to hygienically process dried camel meat product locally known as 'Nyirinyiri'. The CMF unit will be a county asset that will generate revenue for the county and provide an avenue for certification of the hygienically produced dried camel meat product. The CMF unit will initially host 4 processing groups composed of 10 members each in its first six months of operation. Other groups will then be allowed to join in a phased approach once the operation of the facility are streamlined. Each group will be expected to process on a daily basis 200 kgs of fresh camel meat, this will increase the annual nyirinyiri production from the current individual capacity of 5400 glasses(1.62MT) to 216000 glasses (64.8MT) for the group. This will translate to an annual increase of sales from the current Kshs. 1,080,000 (@200 Kshs. per glass) to Kshs. 86,400,000 (@ Kshs. 400 per glass).

A capital investment of Kshs. 37 Million will yield an Internal Rate of Return (IRR) of 120% and a positive Net Present Value (NPV) of Kshs. 172 Million. These financial projections were arrived at using a discounting rate of 14.5% which is the current commercial bank lending rate. The investment criteria with regard to NPV and IRR is to invest when NPV is positive and IRR is greater than the cost of capital investment. The proposed business meets the two criteria and is therefore profitable. However, the benefit cost ratio (BCR) of 0.84 is below the recommended ratio of 1 suggesting that the business should either boost revenue through increased sales or reduce operation costs or both. It should be noted that IRR and NPV when combined are powerful indicators of a business financial viability even if the BCR value is less than 1. The recommendation is that the financial indicators be re-evaluated within the first six months of CMF operations as the figures used in the financial analysis were projections that were largely sourced from oral information given by value chain actors who did not keep financial records for validation purposes. The introductory price suggested by stakeholders in the value chain was Kshs. 400. The Break-Even Price (BEP) analysis indicated that in the first year of business the Nyirinyiri product can be sold at Kshs. 394 which is below what was proposed. In addition, the BEP significantly reduced to Kshs. 231 in the second year assuming that all the fixed cost was recovered within the first year. This decline however, was not sustainable over the rest of the years as the operational costs increased. This trend has the potential of reducing sales as consumers may not pay more in subsequent years after the second year. As such, the business should operate in such a way that the price of Nyirinyiri reduces over time. The suggestion is to spread the fixed costs over a four year period while increasing the units sold by 2% annually. The BEP in year 1 will be Kshs. 264 and by the 7th year, a 300 gram jar of Nyirinyiri would be costing Kshs. 159 which is a 40% decline in consumer price. This is an ideal price trend for a start-up consumer company that will ensure sustainability in the long run.

In conclusion, Wajir County should invest 34.1% (37 Million) of the IDEAS grant in a CMF unit that will be used to process dry camel meat product (Nyirinyiri). The CMF unit is a viable asset for the county that will spur the development of the local economy, generate revenue for the county and foster transparency in the use of public resources thus improving partnerships with the local community. The asset investment will in turn improve the income and livelihoods of nyirinyiri women processing groups as well as allow emergence of new allied private enterprises such as camel hide processing industries.

### ACKNOWLEDGEMENTS

The consultant would like to acknowledge the support provided by various individuals and institutions during the execution of the study. The study was commissioned and logistics supported by the Instruments for Devolution Advice and Support (IDEAS) programme which is being implemented jointly by the European Union (EU) and the Ministry of Devolution and Planning (MoDP). I am particularly grateful to Edward Mwale for his steadfast guidance, Wim Eising, Emmy Mbwanga, Livingstone Mburu and Romina Carrer for their support. Data collection benefited from the support of various government and non-governmental institutions. County government institutions that provided valuable data included Department of Agriculture, Livestock and Fisheries (livestock and veterinary sections) and Department of Public Health and Sanitation. State institutions that provided data on the legal operation requirements for the value chain included NEMA, KEBS and KIRDI. The consultant is particularly grateful to the NGO staff from WASDA, ALDEV and OXFAM who shared their experience and best practices. The team sprit demonstrated by CEC Yusuf Gedi, Deputy Director Livestock production Elijah Lwevo and enumerators Rukia and Aden was crucial for the successful completion of the assignment. The consultant is thankful to Henry Mwololo and Kamau Irungu for their technical assistance during the financial analysis and Phelix Ouma for the graphic design support.

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## **ABBREVIATIONS** AND **A**CRONYMS

ASAL	Arid and Semi-Arid Lands
BCR	Benefit Cost Ratio
BEP	Break Even Price
CA	Contracting Authority
CBA	Cost-Benefit Analysis
CEC	County Executive Committee
CIDP	County Integrated Development Plan
EU	European Union
GHP	Good Hygienic Practices
GMP	Good Manufacturing Practices
GoK	Government of Kenya
IDEAS	Instruments for Devolution Advice and Support
IRR	Internal Rate of Return
KEBS	Kenya Bureau of Standards
Kgs	Kilogrammes
KIRDI	Kenya Industrial Research and Development Institute
KRA	Kenya Revenue Authority
Kshs.	Kenya Shillings
LED	Local Economic Development
M&E	Monitoring and Evaluation
MoDP	Ministry of Devolution and Planning
MT	Metric Tonne
NEMA	National Environmental Management Authority
NGOs	Non-Governmental Organisations
NPV	Net Present Value
PPP	Public-Private Partnership
STE	Short Term Expert
ТА	Technical Assistance
TAT	Technical Assistance Team
ToR	Terms of Reference
VCA	Value Chain Analysis
WASDA	Wajir South Development Association

### **1** INTRODUCTION

The rising human population, growing affluence and change in consumer needs has seen an increase in the demand for animal based protein. Although camel meat is considered a less conventional source of red meat. It is increasingly becoming popular especially for health conscious consumers at it has less fat thus lower cholesterol when compared to beef and mutton. Camel meat also provides a rich source of calcium and unsaturated fatty acids and therefore has the potential to reduce the risk of cardiovascular disease and atherosclerosis. In nomadic societies, camel meat is considered to have health benefits and is used to manage medical conditions such as hyperacidity and hypertension. The global camel meat production in 2011 was approximated to be close to 340,000 tonnes with camel meat contributing 0.18 percent (%) of the global red meat production. Africa and Asia are the largest camel meat producers contributing 62.2% and 35.8% respectively. The main market for camel meat is the Arabian Peninsula with Sub-Saharan Africa being one of its main suppliers.<sup>1</sup>

The Kenyan camel population is estimated to be close to 3.1 Million (M) animals, Kenya has the third largest camel population in Africa behind Somalia (7M) and Sudan (4.7M). The Kenyan camel population is capable of producing 10,000 tonnes of meat annually. However, current estimates indicate that annual production stand at 700 tonnes valued at I billion Kenya Shillings (Kshs.)<sup>2</sup>. Camels are an important livelihood asset that assures food and economic security to pastoralists inhabiting the Arid and Semi-arid Lands (ASALs) of Kenya. The ASALs account for 80% of Kenya's land mass and have an estimated human population of 8.5 million people and host over 60% of Kenyan livestock population<sup>3</sup>. Wajir County is one of the 47 counties of Kenya located in the North Eastern region of the country. Wajir is predominately an arid county that covers a land surface area of 56,685.9 square kilometres (Km<sup>2</sup>) and lies between latitudes 3°N 60' N and 0°20' N and Longitudes 39 °E and 41 °E. The County has an estimated livestock population of 3.5 million animals and has the largest camel herd in the country that is estimated to be more than 533,651 animals.

The annual production of camel meat in the county is more than 191,100 kilograms (Kgs). However, this figure is grossly under represented as most of the camel meat is sold and traded through undocumented channels<sup>4</sup>



### **1.1** BACKGROUND

The new constitution of Kenya introduced a devolved system of governance that aims at improving resource allocation and service delivery. To support the devolution process, the European Union (EU) and the Ministry of Devolution and Planning (MoDP) are implementing a programme called Instruments for Devolution Advice and Support (IDEAS). The overall objective of the IDEAS programme is to contribute to the implementation of the devolution process as outlined in the Constitution of Kenya. The programme will support infrastructure and capacity building activities that will go towards;

- > Improved national institutional capacities to support participatory and accountable fiscal decentralisation and
- > Increased capacity at the County level to facilitate participatory planning and Local Economic Development (LED).

### **1.2 TERMS OF REFERENCE**

The IDEAS programme is offering support grants of 1 million Euros to 15 selected Counties in Kenya. The grant will offer the county government the opportunity to foster transparency in the use of public resources through working together with the local community, private and not-for-profit sectors so as to enhance competitiveness and ensure inclusive and sustainable growth of the local economy. It is under this context that Wajir County developed a concept note that provided a summary of what it wishes to do with the grant. Wajir County proposed to support dry camel meat processing groups with equipment and trainings. The concept note was approved by the IDEAS technical committee and was recommended to move to the next stage of making a full application for the grant. However, the full application process requires a detailed technical evaluation of the proposed undertakings. With this regard, Eurecna (hereinafter the 'client') sought an independent Short-Term Expert (STE) (hereinafter the 'consultant') to carry out the technical assessment of the proposed action would contribute to an integrated and sustainable LED for the target beneficiaries that includes the local community, county government, private and not-for-profit sectors. The specific objectives of the assignment were:

- 1. Conduct a detailed camel meat Value Chain (VC) analysis that describes the specific roles, benefits and constraints of the value chain actors.
- Assess the technical feasibility of the proposed action through development of a business plan, that will allow the county government to demonstrate the technical, financial, operational (legal) and environmental viability of the proposed action.
- Communicate output findings at County and National (MoDP and IDEAS Technical Advisory Team (TAT) levels.

### Main outputs achieved

- 1. Submission of draft reports on April 24<sup>th</sup> 2017;
- Presentation of findings and recommendations to LED County Technical Team, MODP and EU TA in a dissemination meeting held on April 27<sup>th</sup> 2017 in Wajir town;
- Submission to MODP and EU TAT the draft final report that has incorporated dissemination meeting stakeholder comments on 9<sup>th</sup> May 2017.

### 1.2.1 Methodology of the assignment

The field assignment was carried out between 28th March and 18th April 2017. The consultant employed a qualitative and quantitative data collection methodology that included gathering primary and secondary data. Primary data collection was through a participatory approach that used quantitative and qualitative data collection techniques that included;

- 1. Structured questionnaire interviews with 30 meat consumers and 30 butchery owners.
- 2. Key Informant Interviews (KIIs) using a check list of questions with service providers from government and Non-Governmental Organisations (NGOs). Government institutions interviewed included; Department of Agriculture, Livestock and Fisheries and department of Public Health, Medical Services and Sanitation. Kenya Bureau of Standards (KEBS), National Environment Management Authority (NEMA). NGOs interviewed included; - WASDA, ALDEV and OXFAM. KII was also held with a food scientist from Kenya Industrial Research and Development Institute (KIRDI).
- Focus Group Discussions (FGD) and observations were conducted during field visits to the slaughter house in Makoror village and common butcher house facility used by the small scale women butchers/flayers located at ADC market.
- 4. Secondary data was gathered through literature review of published work, existing project reports from NGOs and county government. Secondary data was used to validate the primary data gathered.

### Data analysis

Structured questionnaire responses was subjected to descriptive statistical analysis using Statistical Package for Social Sciences (SPSS) version 16.0 (IBM SPSS Inc., Chicago, Illinois) results were presented as graphical or tabular summaries of the data mean, percentage and range. Quantitative information such as quantity of camel meat traded at each value chain level, purchase and sale price and input production costs were averaged to allow financial viability analysis the following indicators were analysed for;

- > -Net Present Value (NPV);
- > -Internal Rate of Return (IRR);

- > -Benefits/Cost (B/C) ratio;
- > -Break Even Price (BEP).

#### Composition of the Evaluation Team

The evaluation was carried out by the Short Term Expert (STE) Dr. Pauline Gitonga.

### Dissemination meeting

The dissemination meeting was held on April 27<sup>th</sup> 2017 in Wajir County, the STE presented her findings to the IDEAS-LED County Technical Team, MODP and EU officials. The KEBS county representative was also in attendance. The findings of the STE were validated as a true reflection of the current situation of the dry camel meat VC. With regard to the IDEAS grant, the meeting resolved that investment in a Common Manufacturing Facility (CMF) that has an in-built slaughter slab would be the most viable investment. The participants also agreed that investment in the fodder value chain to support camel meat production was not a viable enterprise and should not be supported with the IDEAS grant.

### **2 FINDINGS:** VALUE CHAIN ANALYSIS

Dried camel meat (Nyirinyiri) is prepared from fresh camel meat sourced from either the slaughter house located in Wajir town, Makoror area or from butchery establishments that are located within Wajir town. Nyirinyiri processing for commercial purposes is largely carried out by women in their homesteads, these women have a daily order to supply specific consumers in Wajir town. However, most of the customer base is located in Nairobi, Eastleigh area. Nyirinyiri processing is tedious and is therefore only carried out when there is an order<sup>5</sup>. Once purchased the fresh camel meat is deboned and cut into strips that are left in the sun to dry and later cut into small pieces that are dry fried and later fried with a little vegetable oil and spices. The fried meat is then poured into stainless steel cans (Figure 1) that has hot camel or cow fat that has been melted through heating the mixture is then allowed to cool. Once cooled the fat condenses before it is transported to the consumer.



Figure 1: Stainless steel containers displayed for sale at Orahey market in Wajir town

The dried meat is used for over a 2 to 3 month period through consumption of small portions that are scooped from the can. The nyirinyiri consumer has to ensure hygiene of the scooping utensil so as to prevent spoilage of the entire product. Nyirinyiri is not consumed as a main meal rather as a snack or a meal accompaniment.

### 2.1 VALUE CHAIN ACTORS

The live animal camel market operates every day with the current purchase price ranging from Kshs. 26,000 for a bull 2 to 3 year of age to Kshs. 120,000 for a bull over 5 years of age. During the wet season the purchase price is higher at Kshs. 50 to 60,000. The trader in the camel market is most often a butcher who conducts the slaughter and sells the fresh meat in his private butchery enterprise located within Wajir town. The trader/butcher depending on his regular customer base will buy one camel daily or combine resources with 2 or 3 butchers to purchase one camel. Approximately 10 to 15 camels are slaughtered daily in Wajir town with preference for young bulls 2 to 3 years of age as their meat is tender when compared to the meat from older bulls. The live weight of slaughtered camels ranges from 350 to 450 kgs, given that the camel dressed weight is estimated at 57% of live weight, the carcass weight range should be between 199.5 and 256.5kgs<sup>6</sup>. However, during the study period the carcass weight of slaughter animals averaged 80 to 200 kgs due to the prolonged drought season. About 5 to 10kgs of fresh camel meat is purchased daily to make nyirinyiri.

The Slaughter house is open every day of the week with operations beginning as early as 2 in the morning (am) with slaughter of goats followed by cows then camels. By 7 am all animals have been slaughtered and by 10 am the slaughter house has closed for the day. The consultant observed that there was a general lack of adherence to set guidelines of humane slaughter of animals. In addition, there was lack of adequate infrastructure and equipments to ensure carcasses are hoisted off the ground after slaughter. The slaughter house had poor lighting and inadequate supply of running water. These factors contributed to the lack of Good Hygienic Practice (GHP) when slaughtering and handling fresh camel meat that would later be processed into Nyirinyiri. The lack of GHP was evident across all levels of the value chain. The slaughter house is currently under the management of the town administrator, liquid and solid waste disposal management is inadequate and has resulted in the frequent closure of the slaughter house by the public health department (latest closer was 2 weeks prior to this study). The pictorial flow chart in figure 2 summarises characteristics and role of the camel meat value chain actors.



Figure 2: Pictorial flow chart summarising characteristic and role of the camel meat value chain actors in Wajir town

### Women group butchers/flayers

The operation of all the VC actors is highly individualistic. Only the women butchers whose role is to remove the hide (flay) of the camel during slaughter operate as groups. They share a common selling point premises located at ADC market within Wajir town centre (Figure 3).





Figure 3: Common premise used by the women butcher groups

Figure 4: Camel meat sold on makeshift low bench tops at ADC market

The women butchers (flayers) operate in 8 groups with an average membership number of 10 to 14 individuals. The groups are registered and have opened bank accounts which they use to save contributions that offer soft loans to members. In addition, each woman contributes Kshs. 30 that goes towards paying the Kshs. 3,000 monthly rent to the town administrator. On average each woman trades in 10 kgs of fresh and offal camel meat. The women do not have weighing scales instead they visually estimate meat to be sold, they sell meat in small quantities (Figure 4), ranging from ¼ kg sold for Kshs. 50; ½ kg for Kshs. 100 and 1 kg for Kshs. 200. Offals were sold for between Kshs. 30 and 50. The main operation costs incurred by individual women group butchers is tabulated in table 1 below:

Table 1: Monthly operation cost for a woman butcher/flayer in Wajir

Input cost description	Monthly cost (Kshs.)/30 days
Payment to slaughter man/ butcher@ Kshs. 5,000/weekly	20,000
Rental contribution	300
Transport cost @50/daily (Figure 5)	1,500
Water supply cost @60/daily	1800
Polythene packaging @50/daily	1500
Total	25,100

The daily sale for each woman butcher averaged **Kshs**. **2,000** that translates to monthly sales of Kshs. **60,000** and gross profit of Kshs. **34,900**. The women requested support to repair the roof and floor of the common butchery premises.



Figure 3: Donkey cart meat transporter delivering meat in sacks to the women butcher groups at ADC market

### **Butchery owners**

The butchers who double up as traders in the camel market and slaughter men in the slaughter house operate single or multiple butchery enterprises strategically located near the main markets of Soko Mjinga, Griftu and Orahey (Figure 6). The average age of butchery owners was 44 years with a range of 26 to 65 years, of the 30 butchery owners interviewed only 2 were women (Figure 6). The selling price of camel meat did not fluctuate with the seasons. Instead, it was fixed at Kshs. 400 with most butchery owners indicating that the high risk of conducting business necessitated the price fixing.

2 - Findings: Value Chain analysis



Figure 4: Butchery enterprises in Wajir town

The main operation costs incurred by the single premise butchery owners is tabulated in table 2 below.

Input cost description	Daily cost (Kshs.)	Monthly cost (Kshs.)/30 days	
Live camel market cess	1,000	30,000	
Purchase of live camel @Kshs.26,000 (shared) (3 butchers)	8,700	261,000	
Slaughter house fee	440	13,200	
Rental	500	15,000	
Transport cost	500	15,000	
Water supply cost	100	3,000	
Total	11,240	334,200	

Table 2: Operation cost of Waiir town single premise butchery owners

The daily meat traded averaged 38 kgs with a range of 21 to 70 kgs, using the average quantity of camel meat traded. The butchers on a daily basis sold camel meat worth Kshs. 15,200 that translates to monthly sales of Kshs. 456,000, if you add the monthly flayer payment received of (Kshs. 20,000), the total monthly income for the butcher was therefore Kshs. 476,000 and the monthly gross profits Kshs. 141,800. The main challenge mentioned by the butchers was the lack of appropriate slaughter equipments at the slaughter house. This resulted in the slaughter process being laborious and unhygienic as there was also lack of adequate lighting and water. Most butchers indicated that the daily left-over meat was taken home, the butcher's wife would then choose to make stew for home consumption or make nyirinyiri for sale.

### Camel dry meat processors (Nyirinyiri)

In 2013, ALDEV and WASDA with funds from OXFAM's DFID funded resilience programme supported women in Wajir and Habaswein towns to form nyirinyiri processing groups. A total of 35 groups were formed. At least one group from each of the 7 peri-urban villages in Wajir town was supported with training on hygienic meat handling and processing, market linkage to Nairobi and experiential visits to Kenya Meat Commission (KMC) and Choice meats. The groups were also connected with KIRDI who developed a low cost packaging material for the product (Figure 7). However, once the project was completed in 2015 and with no common premise to process the camel meat the women groups returned to individual backyard processing (Figure 8) and marketing using the original aluminium/ stainless steel packaging container. ALDEV staff estimate that there are about 350 women who are commercial nyirinyiri processors in Wajir town.



Figure 5: Picture demonstrating the KIRDI packaging technology for dry camel meat product (Nyirinyiri) (Source WASDA Report)

During this study, the consultant visited the home of one of the ALDEV beneficiaries at Makoror village (Figure 8). The beneficiary indicated that she was one of the women flayers in the nearby slaughter house and she used approximately 5kgs of fresh camel meat to make nyirinyiri on a daily basis. Her main market was Nairobi (Eastleigh area) with most customers paying in advance for the product inclusive of courier bus charges. Nyirinyiri quantity sold Figure 8: Picture demonstrating the tedious process currently Being used for dry camel meat product (Nyirinyiri)



was measured in terms of glasses, 5kgs of meat produced 15 glasses. Each glass that is approximately 300 grams retailed at Kshs. 200. The processor's monthly operation cost and profit is shown in table 3 below.

Table 3: Monthly operating cost and profit for an individual nyirinyiri processor								
Monthly cups sold (@15 cups/daily)	Monthly income (@Kshs. 200/cup)	Monthly operating cost Kshs. (@purchase price meat =Kshs. 20,000 @Kshs. 4500 (labour, firewood, oil and spices)	Monthly gross profit (Kshs.)					
450	90,000	24,500	65,500					

### **Government and Non-governmental Service Providers**

There is minimal investment by government and non-governmental organisations (NGOs) in this value chain. Table 4 below summarises the role played by key institution that have previously supported the value chain (VC) in Wajir County. The support given by non-state actors particularly ALDEV, WASDA and OXFAM was able to proof that nyirinyiri is a profitable value chain with a high demand especially if targeting Nairobi and diaspora markets. Non-state actors in ASAL counties like Wajir often play a critical role in supporting the county in delivery of key extension services to livestock keepers. Community based organisations such as ALDEV and WASDA were founded by locals and have the community trust and good will.

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Table 4. Summary of interventions provided by service providers					
Institution	Type of	Current			
Department of Agriculture Livestock and Fisheries and Agricultural Sector Develop- ment Support Programme (ASDSP)	Government	<ul> <li>Oversight and co-ordination role so as to ensure interventions are not duplicated</li> <li>Offer technical assistance to NGOs</li> <li>Have previously supplied the butchers with white coats and protective boots.</li> </ul>			
ADESO and VSF-Suisse	NGO	<ul> <li>In 2016, the two organisations played a critical role in training the slaughter house workers on proper meat handling practices. They also provided them with protective clothing (white coats and gumboots).</li> </ul>			
OXFAM-Resilience programme supported implementing part- ners WASDA and ALDEV		<ul> <li>In 2013 to 2015 over 30 women groups from Habaswein and Wajir town were targeted in an initiative to commercialise the Nyirinyiri camel meat trade.</li> <li>The support included training on proper meat handling techniques as well as an experiential field trip to Kenya Meat Commission Plant in Athi River.</li> <li>The women were also connected with KIRDI where they were able to have the nutritive value of product analysed they were also helped to identify suitable packaging and label. The process also allowed for standardization of the product which was has been captured in a manual. The shelf -life of the product was reduced to 2 months from the traditional 4 to 6 months.</li> </ul>			

### Table 4: Summary of interventions provided by service providers

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Kenya Bureau of Standards (KEBS) Government		<ul> <li>The request to certify the nyirinyiri product was rejected due to lack of GHP and Good Manufacturing Practice (GMP) especially due to the current slaughter house state.</li> <li>The organisation is currently drafting the camel dry meat processing standards.</li> </ul>			
National Environmental Man- agement Authority (NEMA)and Department of Public health and sanitation	Government	<ul> <li>The poor waste management has resulted in frequent slaughter house closures which impacts negatively on nyirinyiri processing (Figure 9)</li> <li>Figure 7: Slaughter slab that is not fenced and operators have no protective clothing</li> </ul>			
Kenya Industrial Research and Development In- stitute (KIRDI)	Government	<ul> <li>Were involved in the initial training of nyirinyiri women groups and developed the yoghurt packaging</li> <li>Since then they have conducted further research and have developed a vacuum packed glass jar packaging</li> <li>Figure 8: The new developed dry camel meat processed packaging at KIRDI</li> </ul>			

### 2.2 VALUE CHAIN CONSTRAINTS AND WAY FORWARD

The problem tree diagram in figure 11 summarises the main problem, underlying causes and resultant effects that are hindering the development of dry camel meat processing value chain in Wajir County. Camel meat processing into nyirinyiri provides alternative income to women. A recent study commissioned by OXFAM in 2014, estimated that nyirinyiri annual sales was close to Kshs.0.3 billion. However, the product was informally being traded to secondary markets in Nairobi thus had low market penetration due to lack of KEBS certification. KEBS certification requires strict adherence to hygienic slaughter and processing practices. Given that the current slaughter house state would be a constant hindrance to this value chain. Discussions on way forward with Wajir County livestock production staff during the dissemination meeting and KIRDI research scientist suggested that the processing groups should be supported with a common manufacturing facility (CMF) that has its own well designed slaughter slab (category C) and hygienic processing area that meets food processing standards. This will ensure that the nyirinyiri product produced will meet KEBS standard thus allow access to other non-traditional market outlets such as supermarkets, grocery shops, restaurants and hotels. Capacity skill training will also be required to train the women processing groups on GHP and GMP as well as legal requirements such as public health certification. The proposed CMF unit will offer a platform for camel meat VC actors to collectively lobby for improvement of the sector including improvement of the slaughter house management as well as lobby to push for publication of the nyirinyiri processing manual and the camel dry meat processing standards currently being drafted by KEBS.

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CAMEL MEAT VALUE CHAIN ANALYSIS and FEASBILITY STUDY – WAJIR County



Figure 9: Problem tree analysis summarising main constraints of camel meat sector

### **3** FEASIBILITY STUDY

### 3.1 BACKGROUND

Wajir County has proposed to invest part of the IDEAS grant to support dry camel meat processing groups with equipment and training on good hygienic and manufacturing practices. The proposed action will involve the setting up of a Common Manufacturing Facility (CMF) that will be used to process the camel dried meat product locally known as 'Nyirinyiri'. A SWOT analysis for establishing the Common Manufacturing Facility (CMF) for processing dry camel meat (Nyirinyiri) is given below;

### Strengths

- > There is a ready market potential for the product given the rising human population in Sub-Saharan Africa.
- > Kenya is ranked as one of the leading camel meat producing nations in the world, while Wajir County hosts the largest camel herd population in Kenya.
- > Camel meat production in Wajir is based on extensive use of natural rangelands making it a low input system thus can offer high margins of return for a meat processing plant.
- > There is available human resource in form of women who are already involved in commercial Nyirinyiri production.
- > There exists a daily livestock market in Wajir town to meet the daily requirement for the camel meat processing plant.

#### Weaknesses

- > Nyirinyiri processing is carried out in an individual capacity in home based enterprises that are largely dependent on pre-placed orders from specific clientele rather than the conventional market demand and supply forces.
- > Lack of consumer awareness of the product outside the Somali community.
- > Low saving, low holding capacity of the individual enterprise.
- > Camel meat sector lacks policies, regulations and coordination towards a common vision and goal.
- Lack of technical skills in modern meat processing with heavy reliance on traditional approach that is unhygienic, tedious and inefficient due to obsolete skills and techniques.

### Opportunities

- > Increasing demand for value added meat products, that is much higher than supply
- Increased funding by development partners, National and County government to support home grown industries so as to be able to meet vision 2030 goal of transforming Kenya into a middle income country by the year 2030. (IDEAS programme grant).
- > The commercial viability of the sector has previously been demonstrated (OXFAM), with credit potential opportunity locally available in Wajir (Crescent Takaful Sacco).

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- > Forming processing cooperatives or groups can spread the risk and allow pooling of resources to upscale production.
- > The sector can generate opportunities for other new enterprises to distribute the product within and outside the county as well as encourage private enterprises to partner with community to set up similar CMF units for other livestock products such as camel hide leather industries.

### Threats

- Competition from other camel keeping ASAL counties being supported to develop similar industries this will result in competitive commodity pricing which may lower projected incomes and profits.
- > Defective and unorganized markets that do not respond to demand and supply market forces.
- > Social-cultural taste preferences and beliefs of non- Somali community consumers who prefer beef and goat meat products.

### 3.2 BUSINESS PLAN

### Business definition and value proposition

The enterprise/business will deal predominantly with supporting women groups engaged in commercial processing of dried camel meat product locally known as "Nyirinyiri'. The main support will be the construction of a Common Manufacturing Facility (CMF) unit that has its own in-built slaughter slab. The CMF unit will provide nyirinyiri processing women groups with a hygienic facility that meets animal welfare standards as well as Good Manufacturing Practices (GMP) standards. The product will be able to acquire KEBS certification thus allowing it to competitively enter into the formal processed food market.

### Vision

To be the leading camel meat processing plant in Kenya.

### Mission

To increase the income of dry camel meat (Nyirinyiri) processing groups through hygienic and efficient scaling up of production and efficient value addition of camel meat.

### Beneficiaries

- > The main beneficiaries of the action will be the 350 women who are commercially processing nyirinyiri in and around Wajir town. The women are currently operating individually in home based enterprises. The CMF unit will allow women to spread risk, pool resources and increase production and incomes.
- > County government will gain a new revenue stream from the CMF unit
- > The community will have a hygienic and safe product to consume.

- The private sector will be spurred to invest in partnerships with communities in similar
   CMF models for other camel or livestock products.
- > Quality standards will be put in place to regulate the camel meat sector.
- > Increased awareness and research on the health and nutritive benefits of camel meat.

## CAMEL MEAT VALUE CHAIN ANALYSIS and FEASBILITY STUDY – WAJIR County

	Specific Objective	Major Activities and expected outcomes	Timeline
1.	Provide a hygienic camel meat processing facility for 4 pilot groups	<ul> <li>Seek legal approval from relevant authorities within and outside the county (public works and NEMA)</li> <li>Construct a CMF facility with a slaughter slab</li> <li>Acquire business permits and licenses</li> </ul>	<ul> <li>September</li> <li>2017-</li> <li>February</li> <li>2018</li> </ul>
2.	<ul> <li>Increase in annual nyirinyiri production and sales due to collective group processing</li> <li>Increase production from current 5400 glasses(1.62MT) to 216000 glasses (64.8MT)</li> <li>Increase sales from current Kshs. 1,080,000 (@200 Kshs. per glass) to Kshs. 86,400,000 (@400 per glass)</li> </ul>	<ul> <li>Recruit a qualified personnel to run the CMF unit</li> <li>Mobilise existing processing groups with the help of NGOs (ALDEV) who will be recruited on a short term basis to mobilise and train groups.</li> <li>Recruit KIRDI staff on a short term basis to train groups on GHP and GMP.</li> <li>Begin processing nyirinyiri on a daily basis using a rotational schedule for the 4 pilot groups.</li> <li>Register for KEBS and KRA certification</li> </ul>	March 2018- And beyond
3	Increase county revenue collection through asset creation	<ul> <li>Groups will pay a monthly CMF user fee which will serve as the revenue stream for the county</li> <li>Additional revenue will be generated through annual dividend sharing of profits</li> </ul>	January 2018- And beyond
4.	Create opportunities for new local business creation or Public- Private Partnerships (PPP) for example- private entrepreneurs can start nyirinyiri selling points or distribution centres. Or they can partner with community to begin CMF centres for other livestock products.	<ul> <li>Share CMF business plan and best practices model with potential private</li> <li>Entrepreneurs/ cooperatives/ groups.</li> </ul>	December     2018 and     beyond

### Specific objectives, planned activities and expected outcomes

### 3.3 PRODUCTION PLAN

### Products

The main product will be processed dry camel meat that is preserved in either animal fat or low-cholesterol vegetable oil. Other products from the processing will include the hump-fat, hides, bone meat and offals. The business will also in time diversify into other camel meat products such as sausages.

### Proposed production process

The women will be supported to reconstitute or form new processing groups composed of 10 members. The initial seed capital will support 4 pilot groups. The women will pay a monthly user fee of Kshs. 20,000 to be able to utilise the CMF unit which will have its own slaughter slab. The processing women groups will utilise the CMF unit on a rotational basis ensuring that each group is able to process enough quantities to ensure a good monthly income. The rotation schedule will be consultatively agreed upon once the groups are trained on equipment use and evaluation done on how fast they are able to utilise the equipments for processing. The schedule will also be based on the groups existing market/consumer base. The groups will be expected to process on a daily basis approximately 200 kgs of fresh camel meat, this is up from an individual capacity of 5 to 10 kgs. This translates to an increase in annual nyirinyiri production from current production of 5400 glasses<sup>1</sup>(1.62MT) to 216000 glasses (64.8MT) and an increased annual sale income from the current Kshs. 1,080,000 (@200 Kshs. per glass) to Kshs. 86,400,000 (@400 per glass).

### Licensing and Legal requirements

The first step in the production process will be to acquire land from the county, this will be at no cost to the county as most land is still held in trust by the county. Relevant County department (public works and others) and NEMA approvals will then be sought after conducting an environmental impact assessment. Once approved the slaughter slab and the CMF unit will be built. After construction, certificates of completion and occupation will then be applied for. Application for KEBS certification will begin on the second month of CMF unit operation.

<sup>&</sup>lt;sup>1</sup> One (1) glass holds 300 grams (g) of nyirinyiri 3 glasses are currently been sold as 1 kg.

The business will ensure that all annual requirements for personnel and business licensing are acquired and renewed for example all staff women processors will require a public health certificate. The KEBS certification requires the company to have a KRA pin certificate, this will be applied for, however the business will request for a tax waiver for the first one year.

### **Production inputs**

Table 5 below summarises the types of capital investment that require to be sourced using the IDEAS seed capital grant. Operating expenses are only required for the first six months as the business will generate significant amount of income from products sales within the first few months of operation. The complete list of equipments to be procured for the CMF unit is attached as Annex 1 while the CMF architectural design is attached as Annex 2 and was provided by KIRDI.

Table 5: summary of capital investment inputs					
Seed capital expenditure	Amount				
Construction of slaughter slab	2,500,000.00				
Construction of CMF	15,526,000.00				
Total - Capex	18,026,000.00				
6 months opex	19,536,000.00				
Total seed grant required	37,562,000.00				

#### 3.4 CMF MANAGEMENT AND PERSONNEL

The county department of Agriculture, Livestock and Fisheries specifically the livestock production section will be in charge of implementation of the IDEAS grant project. Given that the current human resource of the livestock section is composed of only 7 technical personnel who are already too few to currently meet the county needs. The CMF unit will require to hire personnel and work with other state and non-state service providers such as NGOs and consultants to implement and run some of the proposed actions. Key institutions such as KIRDI will offer technical support on how to manage the CMF unit as well as train women groups on GHP and GMP. NGOs such as ALDEV and OXFAM will be contracted on short term basis to assist on group formation, governance and market linkages.

### **Recruitment and remuneration**

The CMF unit will employ 4 personnel whose role is outlined in figure 12 below. The daily management of the unit will be under an experienced CMF manger. Personnel recruitment will adhere to the set

recruitment procedures that ensures transparency and strict vetting of applicants. Given that the business will make high returns in the first months of operation all the 4 workers will draw their salaries from the business and not from the IDEAS grant. The remuneration package provided will ensure staff retention as the salaries will be competitive. The role of the CMF manager will include;

- Set organisation policy including scheduling the rota for the groups (ensure each group processes products regularly to ensure improved and sustained weekly and monthly income.
- Set prices for product based on prevailing market behaviour and remit monthly income to the processing groups
- > Make purchase decisions for equipment and inputs.
- > Secure orders for existing and new markets
- > Manage company financial records so that they are ready for external auditing
- > Assure product quality
- > Ensure all legal and insurance requirements are met



Figure 10: Proposed Camel meat CMF organization structure

### 3.5 MARKETING PLAN

#### Target Market

Kenyans consume an annual average of 15-16 kgs of red meat (meat and offal from cattle, sheep, goats and camels). The annual national red meat production is approximately 600,000 MT. Cattle are the most important source of red meat, accounting for 77% of Kenya's ruminant off-take for slaughter. The Kenyan meat market is primarily urban and is stratified according to income, with the middle class accounting for majority of meat consumers in the urban centres<sup>7</sup>. The target market segment for nyirinyiri product will be;

- 1. *Traditional urban markets within Wajir county and Nairobi* The improved hygienic product is expected to gain more acceptance and attract a larger Somali community consumer base. The increased production means that a supply chain of the product can now be readily sustained to stock existing food establishments, supermarkets and grocery shops in Wajir and Nairobi's Eastleigh area.
- 2. *Diaspora market-* Somali community in the diaspora who demand for premium quality for the product.
- 3. New market- consumer base who seek to experience new food products.
- 4. *Food relief* Given the frequent drought episodes that occur in the county, the business will seek to go into partnership with government and NGOs tasked with food relief and distribution.

#### **Promotion strategy**

The main goal of the business is to hygienically process fresh camel meat into nyirinyiri product which will be marketed at a premium price. The first marketing strategy will be the creation of awareness of the hygienically processed nyirinyiri product in the traditional primary (Wajir town) and secondary (Nairobi Eastleigh) markets. This will be done through barazars, print and radio advertisement especially in the secondary markets. The women processors will also be trained on business and marketing skills. This will allow them to start local nyirinyiri outlets so that they can sustain a continuous supply of the product within Wajir town. The Somali community in the diaspora will also be targeted



Figure 13: Nyirinyiri product accompanying a popular food 'Chapati'

through product promotional campaigns that will be ran through the internet. Entry into new markets that traditionally consume other livestock species will be done gradually, the product will first be promoted in hotels and restaurant establishments that serve meat from other non-conventional livestock and wildlife species such as ostrich, game meat, crocodile and rabbits. This new customer base will offer insight into the perception of the dry camel meat product amongst non-Somali consumers. This feedback will then be used to tailor promotion information that addresses the new consumer concerns and meet their taste preference. Preferably this promotion strategy will include recipes that incorporate the nyirinyiri product in foods regularly eaten by the new consumer (Figure 13) above.

### **Pricing and Competition**

The business aims to increase its production by 2% annually, the nyirinyiri product will be packaged in a new vacuum sealed 300 gram glass jars (Figure 14).

The improved hygienic processing and packaging should allow the product to be sold at double the current price. The 300 grams product will be sold for an introductory price of Kshs. 400 that translates to Kshs.1, 200 for 1 kg. The initial price offer will apply to both products (nyirinyiri preserved in low-cholesterol vegetable oil and one preserved using camel or cattle ghee/fat). The current aluminium, stainless steel packaging will still be initially used especially for customers buying large quantities of over 3 kgs. This will be phased out once a suitable a bulk packaging material is developed.



Figure 12: Proposed packaging for the processed dried camel meat product (Nyirinyiri)

The pricing set has taken the following into consideration;

- Consumer responses gathered during the field study, most (88%) indicated they were willing to pay more for a hygienic and well packaged product.
- > Suggestions by the stakeholders during the dissemination meeting held in Wajir town.

### Competition

Indirect competion will be from other red meat products such as beef and chevon (goat meat). To win over the beef and chevon consumers, the business will require to invest in a product awareness campaign that highlights the benefits of camel meat and assures the hygiene of the product. The product has direct competion from other ASAL counties that rear camels like Isiolo. Although these counties produce nyirinyiri and sell to the same secondary market, the products have not been KEBS certified. If Wajir County is able to set up the CMF unit by end of 2017 and have it fully operation by early 2018, the business will be able to enjoy the monopoly of having a KEBS certified product that will allow them to set up competitive pricing even if other counties produce a similar product in the future.

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### **3.6 FINANCIAL PLAN –** CASH FLOW STATEMENTS

The Wajir county CMF for dry camel meat (nyirinyiri) processing also dubbed CMF unit will require a seed capital investment of Kshs. 37,562,000.00 million. This is 34.1% of the Kshs. 110 million IDEAS grant. The main revenue will be from sale of the dry camel meat product (Nyirinyiri). Sale of offals and hides will contribute to CMF revenue though minimally. The cash flow statements below demonstrate that the business will be self-sustaining and make profits within the first year of operation and will continue to make profits for the 7 year projected period (Table 6). The gross profits would support payment of monthly income or annual dividends in a 70% (women processors) and 30% county government arrangement. It is estimated in the first year each individual group member will be able to earn a monthly income of Kshs. 173,028.33 when compared to Kshs. 90,000 that she earned when she worked individually.

Camel meat processing CME unit cash flow projections								
	Seed	2018	2019	2020	2021	2022	2023	2024
Capital Expenditure	Capital							
Construction of slaughter slab	2,500,000							
Construction of CMF	15,526,000							
<u>Total - Capex</u>	18,026,000							
6 months Total opex	19,536,000							
Total seed grant required	37,562,000							
Incomes								
Income - Sale of nyirinyiri		86,400,000	90,720,000	95,256,000	100,018,800	105,019,740	110,270,727	115,784,263
Income - Sale of offals and hide		120,000	126,000	132,300	138,915	145,861	153,154	160,811
Income-CMF user fee@20,0	000/monthly	240,000	252,000	264,600	277,830	291,722	306,308	321,623
Total Income		86,760,000	91,098,000	95,652,900	100,435,545	105,457,322	110,730,188	116,266,698
<u>Expenses</u>								

### Table 6: Cash flow projections for the CMF Camel meat processing unit

## CAMEL MEAT VALUE CHAIN ANALYSIS and FEASBILITY STUDY – WAJIR County

Maintenance of slaughter							
slab	600,000	600,000	600,000	600,000	600,000	600,000	600,000
Maintenance of CMF	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000
<u>Total - OpEx</u>	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000
Operating Expenses							
Training and Research(con- tract service providers)	5,000,000	4,500,000	4,000,000	3,500,000	3,000,000	2,500,000	2,000,000
Product promotion (adver- tisement, food fairs)	1,000,000	1,000,000	1,000,000	500,000	250,000	250,000	250,000
Glass jar packaging (annual 216000 jars@60/-)	12,960,000	14,760,000	16,560,000	17,760,000	18,960,000	20,160,000	21,960,000
Purchase of camel @50,000/day	18,000,000	18,900,000	19,845,000	20,837,250	21,879,113	22,973,068	24,121,722
CMF man- ager@120,000/month	1,440,000	1,584,000	1,742,400	1,916,640	2,108,304	2,319,134	2,551,048
Unit worker 1@20,000/month	240,000	264,000	290,400	319,440	351,384	386,522	425,175
Casual Unit worker @10000/month	120,000	132,000	145,200	159,720	175,692	193,261	212,587
Night Guard@8,000/month	96,000	105,600	116,160	127,776	140,554	154,609	170,070
Electricity	36,000	39,600	43,560	47,916	52,708	57,978	63,776
Water Bore hole							
maintenance	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Total for Opex _	39,072,000	41,465,200	43,922,720	45,348,742	47,097,754	49,174,573	51,934,377

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### CAMEL MEAT VALUE CHAIN ANALYSIS and FEASBILITY STUDY - WAJIR County

Gross Profit / Loss Year 6

Gross Profit / Loss Year 7

			Dividends @70% of profit	Annual Mem- ber payment	Monthly mem- ber pay out	Retained Earn- ings
Gross Profit / Loss Year 1		29,662,000	20,763,400	2,076,340	173,028	8,898,600
Gross Profit / Loss Year 2		45,432,800	31,802,960	3,180,296	265,025	13,629,840
Gross Profit / Loss Year 3		47,530,180	33,271,126	3,327,113	277,259	14,259,054
Gross Profit / Loss Year 4		50,886,803	35,620,762	3,562,076	296,840	15,266,041
Gross Profit / Loss Year 5		54,159,569	37,911,698	3,791,170	315,931	16,247,871
	a and a second second			Server and the server		and the second second

57,355,615

60,132,320

40,148,930

42,092,624

4,014,893

4,209,262

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### 3 - feasibility study

17,206,684

18,039,696

334,574

350,772

### Financial viability analysis

The financial viability of the dry camel meat processing CMF was determined using the following financial sustainability indicators;

- > Benefits/Cost (B/C) ratio;
- > Net Present Value (NPV)
- > Internal Rate of Return (IRR)
- > Break-even price (BEP)

The net present value (NPV) is positive and the internal rate of return (IRR) is greater than cost of capital (Table 7). The investment criteria with regard to NPV and IRR is to invest whenever NPV is positive and IRR is greater the cost of capital. The proposed business meets the two criteria and is therefore a profitable venture. The benefit cost ratio (BCR) of 0.84 is below the recommended ratio of 1 suggesting that the business should either boost revenue through increased sales or reduce operation costs or both. The NPV and IRR was greater than cost of capital for the proposed see table 7 below.

Year	Discounted Income (DI)	Discounted Cost (DC)	Gross Present Value (GPV)
1	75,772,926	37,792,140	37,980,786
2	69,486,089	34,831,678	34,654,412
3	63,720,868	32,057,799	31,663,068
4	58,433,984	28,827,746	29,606,238
5	53,585,749	26,065,791	27,519,958
6	49,139,770	23,686,533	25,453,237
7	45,062,671	21,756,574	23,306,097
Total	415,202,056	205,018,261	210,183,796
Capita	Investment		37,562,000
NPV			172,621,796
BCR			0.84
IRR		120%	
Discou	nting rate		14.5%

Table 7: Financial viability of the CMF Nyirinyiri enterprise in Wajir

Change in market interest rate is inevitable and it is therefore imperative to assess the effect of such a change on NPV and BCR for the proposed business. If cost of capital is reduced to 10%, NPV would increase while remaining positive whereas the BCR would improve to 0.87 (Table 8). In case of an increase in interest rate to 20%, NPV would decline but remain positive while BCR would slightly worsen by 0.03 units (Table 8). The implication of this finding is that, the projected revenue from the proposed business is stable even if market lending rates were to increase.

Table 8: Sensitivity analysis of the NPV, BCR estimates									
	10%	14.5%	20%						
NPV	206,848,782	172,621,796	140,030,387						
BCR	0.87	0.84	0.81						

The break-even price (BEP) of selling Nyirinyiri during the first year of business is Kshs. 394 which is below what was suggested (Kshs. 400). This implies that the business will make profits (Table 9). This price significantly reduces to Kshs. 231 in the second year assuming that all the fixed is recovered in the first year (Table 9). However, the decline is not sustained over the rest of the years as operational costs increase. This trend has the potential of reducing sales as consumers may not pay more in subsequent years after the second year.

Table 9: Break-even price (scenario 1)

Year	Fixed Cost	Units sold (Glass jars)	Fixed costs per jar	Total variable cost (TVC)	VC/jar	BEP (FC/jar+VC/jar)
1	37,562,000	216,000	174	47,592,000	220	394
2	-	216,000	-	49,985,200	231	231
3	-	216,000	-	52,442,720	243	243
4	-	216,000		53,868,742	249	249
5	-	216,000	-	55,617,754	257	257
6		216,000		57,694,573	267	267
7	-	216,000	-	60,454,377	280	280

#### Assumptions for scenario 1:

Capital investment is recovered in year 1 Units sold are constant over the analysis period Units sold are for Nyirinyiri

With this in mind, the CMF enterprise should operate in such a way that, the price of Nyirinyiri reduces over time. To achieve a reducing BEP, two scenarios are available for the CMF unit including increasing units sold (currently fixed at 260,000 glasses) or spreading the fixed costs over a longer period of time. In addition to increasing the total revenue of the CMF unit, re-estimation of the revenue from other products such as offal and hides needs to be done. The fixed cost was spread over 4 years and unit production of nyirinyiri glasses increased annually by 2%. The BEP in the 1<sup>st</sup> year was Kshs. 264 (Table 10) and by the 7<sup>th</sup> year, a jar of Nyirinyiri could cost Kshs. 159 which is a 40% decline in consumer price which is an ideal price trend for a start-up consumer company.

CAMEL MEAT VALUE CHAIN ANALYSIS and

Table 10: Break-even price (Scenario 2)										
Year	Fixed cost	Units sold (Glass jars)	Fixed costs/jar	Total variable cost VC/jar		BEP (FC/jar+VC/jar)				
1	9,390,500	216,000	43	47,592,000	220	264				
2	9,390,500	228,960	41	50,244,400	219	260				
3	9,390,500	247,277	38	53,068,256	215	253				
4	9,390,500	272,004	35	54,988,832	202	237				
5	-	304,645	-	57,390,654	188	188				
6	-	347,295	-	60,320,480	174	174				
7	-	402,863	-	64,191,629	159	159				

### Assumptions:

Fixed cost is recovered in the first four years Units sold increase by 2% annually for the period of analysis Units sold are for Nyirinyiri glass jars

### Recommendation

The recommendation is that all financial indicators specifically BCR and BEP be re-evaluated within the first six months of CMF operations as the figures used in the financial analysis were projections that were largely sourced from oral information given by value chain actors who did not keep financial records for validation purposes.

### 3.7 RISK ANALYSIS

The table below gives a breakdown of the possible risks to be encountered their description and the mitigation measures that can be taken to reduce their effects.

Type of risk	Description	Mitigation strategy
Environment risk	Wet season price hike and	Plan ahead through identifi-
Erratic supply and high pur-	low supply of animals in the	cation of a dedicated sup-
chase price for the live ani-	market	plier/producer whose pur-
mal		chase price has been previ-
		ously negotiated.
Social risk	Clanism and individualism	Ensure groups formed are
		an inclusive representation
		of the community. Groups
		will then be trained on group
		governance and made aware

		of the advantages of running
		enterprises as groups.
ke risk	Product fails to gain con-	Aggressive sales and market-
	sumer acceptance in new	ing strategies that ensures
	customer base or due to in-	pre-orders of products is se-

### **3.8 ENVIRONMENTAL ISSUE**

Product upta

The Environmental Management and Coordination Act (Cap.387, Laws of Kenya), sets guideline for waste management. The county government (livestock production section) together with NEMA will contract an independent consultant to conduct an environmental impact assessment of the proposed CMF site construction. The impact assessment will come up with a waste management plan that should incorporate guidelines for liquid and solid waste management as well as indicators to help monitor the effect of the slaughter slab sludge and waste water generated from nyirinyiri processing. A 500 metres buffer zone will be established between the CMF unit and the surrounding residential areas in order to minimize negative effects for example overflow of sludge during heavy rains.

creased production existing

market is unable to fully ab-

sorb increased volumes of

product.

### **3.9 IMPLEMENTATION** SCHEDULE

The construction and commencement of operation for the CMF unit should be within 8 months after signing of the contract. Key activities that need to start early in the implementing phase includes:

- Seeking approval for CMF unit construction from competent authorities in the county-Environmental clearance-NEMA, Construction –county department of Roads, Transport and Public Works and request for supply connection of power- Kenya Power and Watercounty department of Water, Energy, Environment and Natural Resources.
- 2. Advanced setting up of project bank accounts and appointment of personnel who will approve and account for the funds.

cured. Sustained awareness

creation amongst the new

market segment

- 3. Advanced tender floating and evaluation of invoices for procurement of contractor for construction of CMF unit and supply of processing equipments.
- 4. Advanced call for short term consultancy services to capacity build and train the processing groups.
- 5. Advertisement and competitively recruit CMF unit personnel

## CAMEL MEAT VALUE CHAIN ANALYSIS and FEASBILITY STUDY – WAJIR County

Activity	Activity Timeline months (18months) September 2017 – March 2019																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Seek approval NEMA, Public																		
works																		
1. Construction of CMF unit and																		
slaughter slab and tender to sup-																		
ply equipments																		
2. Contract short term service																		
providers to mobilise and train																		
nyirinyiri processing groups																		
3. Installation of equipments and																		
machinery in the newly con-																		
structed CMF unit																		
4. Hiring of CMF unit personnel																		
and conducting trial production																		
runs																		
5. Commissioning of CMF unit op-																		
erations																		

### **CONCLUSIONS AND RECOMMENDATIONS**

In conclusion, the main challenge hindering the large scale production of the dried camel meat product (Nyirinyiri) is the lack of adherence to the standardised Good Manufacturing Practices (GMP). The critical one being lack of Good Hygienic Practices (GHP) across all levels of the value chain. The lack of adherence to set standards is mainly due to lack of financial and infrastructure resources. In addition, value chain actors operate largely in an individual capacity resulting in small scale operation that yield profits but these profits are not enough to scale up individual production capacity or attract private investors. The role of actors (public (KIRDI, KEBS, NEMA) and NGOs (ALDEV, WASDA, OXFAM, ADESO/VSF-Suisse) has been critical in demonstrating the commercial viability of the value chain as well as setting the required standards for operation. NGOs were able to provide GHP training as well as provide protective clothing for slaughter house workers. However, these interventions were project based hence could not be sustained beyond the project period. To mitigate these challenges, Wajir County (livestock production section) will utilise 34.1% (approximately Kshs. 37 M) of the Kshs. 110 million IDEAS grant to set up a common manufacturing facility (CMF) unit that has an inbuilt slaughter slab. The CMF unit will be used to process dry camel meat product locally known as Nyirinyiri.

The CMF unit will be an asset for the county government that will not only generate revenue for the county but also provide a hygienic and KEBS certifiable facility for nyirinyiri processing. The processing groups will be expected to process on a daily basis approximately 200 kgs of fresh camel meat up from an individual 5-10 kgs capacity. This translates to an increase in annual nyirinyiri production from current 5400 glasses (1.62MT) to 216000 glasses (64.8MT) and an increase in sales from current Kshs. 1,080,000 (@200 Kshs. per glass) to Kshs. 86,400,000 (@400 per glass). A capital investment of Kshs. 37,562,000 Millions yields an Internal Rate of Return (IRR) of 120% and a positive Net Present Value (NPV) of Kshs. 172,621,796 Million. This was arrived at using a discounting rate of 14.5% which is the current commercial bank lending rate. The investment criteria with regard to NPV and IRR is to invest whenever NPV is positive and IRR is greater the cost of capital. The proposed business meets the two criteria and therefore is profitable. The benefit cost ratio (BCR) of 0.84 is below the recommended ratio of 1 suggesting that the business should either boost revenue through increased sales or reduce operation costs or both. However it should be noted that IRR and NPV when combined are more powerful indicators of a business financial viability even when the BCR is less than 1. The recommendation is that the financial indicators be re-evaluated within the first six months of CMF operations as the figures used in the financial

cial analysis were projections that were largely sourced from oral information given by value chain actors who did not keep financial records for validation purposes. The introductory price suggested by stakeholders in the value chain was Kshs. 400. However, the Break-Even Price (BEP) analysis indicate that in the first year of business the product can be sold at Kshs. 394 which is below what was proposed this is assuming that all the fixed cost was recovered within the first year. However, the decline is not sustained over the rest of the years as the operational costs increased. This trend has the potential of reducing sales as consumers may not pay more in subsequent years after the second year. As such, the business should operate in such a way that the price of Nyirinyiri reduces over time. The suggestion is to spread the fixed costs over a four year period while increasing the units sold by 2% annually. The BEP in year 1 will be Kshs. 264 and by the 7th year, a 300 gram jar of Nyirinyiri would be costing Kshs. 159 which is a 40% decline in consumer price. This is an ideal price trend for a start-up consumer company that will ensure sustainability in the long run.

The consultant recommends that Wajir County should invest 34.1% (37 Million) of the IDEAS grant in a CMF unit asset that will be used to process dry camel meat product (Nyirinyiri). The CMF unit is a viable asset for the county that will spur the development of the local economy, generate revenue for the county and foster transparency in the use of public resources thus improving partnerships with the local community. The asset investment will in turn improve the income and livelihoods of nyirinyiri women processing groups as well as allow emergence of new allied private enterprises such as camel hide processing industries.

### Annex 1 -CMF EQUIPMENT COSTING

	CMF unit Equipment		Number of	
S/N	description	Cost per unit	Units	Total amounts
1	Stainless steel tables	120,000	5	600,000.00
	Slicing blade mounted on steel table			
2	(500kgs/hour)	250,000	5	1,250,000.00
3	Weighing balance (0.1-6kgs)	45,000	2	90,000.00
4	Platform balance (1g-200kgs)	50,000	1	50,000.00
5	Commercial gas cooker-4 burners	150,000	2	300,000.00
	Solar drier-tunnel type (custom			500 000 00
6	made)	500,000	1	500,000.00
7	Water storage tank	20,000	2	40,000.00
8	Water treatment machine	350,000	1	350,000.00
9	Booster pump	10,000	1	10,000.00
10	Fridge	150,000	1	150,000.00
11	Chest freezer	100,000	1	100,000.00
12	Electric saw meat cutter	60,000	1	60,000.00
13	Bowl chopper	350,000	1	350,000.00
14	Sausage stuffer	30,000	1	30,000.00
15	Motorized meat mincer	90,000	1	90,000.00
16	Can steamer	350,000	1	350,000.00
17	Air compressor	350,000	1	350,000.00
18	Can retort (sterilizer	250,000	1	250,000.00
19	Can washer	300,000	1	300,000.00
20	Can cooling bath	50,000	1	50,000.00
21	Label applicator	5,000	1	5,000.00
22	Cold bath for retort	150,000	1	150,000.00

### CAMEL MEAT VALUE CHAIN ANALYSIS and

FEASBILITY STUDY - WAJIR County

23	Can tester	150,000	1	150,000.00
24	Vacuum sealer	130,000	1	130,000.00
25	UV insect killer	10,000	4	40,000.00
26	Shrink wrapping machine	300,000	1	300,000.00
27	Chopping boards	1,500	10	15,000.00
28	SS knives	1,000	20	20,000.00
29	Plastic aprons	1,200	20	24,000.00
30	Dust-coats	1,000	20	20,000.00
31	Head scuffs/caps	100	20	2,000.00
32	Thermometer-digital	25,000	1	25,000.00
33	Infra-red moisture meter	150,000	1	150,000.00
34	Ink jet cooling machine	50,000	1	50,000.00
35	Spices mill	30,000	1	30,000.00
36	Printed flexi pouches-250g	50,000	10	500,000.00
37	Assorted glass jars and cans	500,000	1	500,000.00
38	Sausage casings	1,200	50	60,000.00
39	Shrink wrapping polythene roll	5,000	1	5,000.00
40	Assorted sizes safety boots	4,000	20	80,000.00
41	ers	1,000,000	1	1,000,000.00
			Subtotal 1	8,526,000.00
Capital E	xpenditure I			
	Construction of slaughter slab	2,500,000.00	1	2,500,000.00
	Construction of CMF	7,000,000.00	1	7,000,000.00
	9,500,000.00			
			Grand total	18.026.000.00

### GENERAL NOTES HART OF PLATER posts interfactor revision 32 description date STATISTICS. 101 parties | titles 251 allend 11 Distanced for Î diates in 11 00 coundinant 16.16 date

### Annex 2 : CMF UNIT ARCHITECTURAL DESIGN

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