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CAMEL MILK VALUE CHAIN ANALYSIS AND FEASIBILITY 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]



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EXECUTIVE SUMMARY

The report details the findings of a camel milk sector value chain analysis and feasibility study carried out in Wajir County between 27th March and 5th 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 Kshs. 56,318,040.00 (51.2% of total 110 million grant) in Camel milk solar chilling and bulking kiosks. The kiosks will be constructed in 5 of the previously identified 8 camel milk corridor routes so as to ensure equal resource allocation. Two management models are proposed the first is to build and rent the kiosks in a tenant-lease arrangement with the primary and secondary traders. The second model is a public-private partnership with a private entrepreneur, Nourishing Nomads (NNL), the county will build the solar kiosks and NNL will manage and maintain the asset for an agreed period of time, the revenue generated will then be shared with the county in a70% (NNL); 30%(county-livestock section) sharing agreement.

The business case for the camel milk chilling and bulking kiosk at the primary trader level when evaluated on the basis of the Gross Profit Analysis (GPA) made profits throughout the 7-year evaluation period. However, when analysis discounted income and cost of the enterprise over time, the net present value (NPV) was negative approximately 17 Million Kshs. against a capital investment of approximately Kshs. 33 Million. The internal rate of return (IRR) and benefit cost ratio (BCR) were also negative. However, at secondary trader level a capital investment of approximately 23 Million Kshs. yielded an Internal Rate of Return (IRR) of 89% and a positive Net Present Value (NPV) of Kshs. 73 Million. This means that investment of kiosks at the primary trader level will not be commercially viable. However, benefits accrued to supporting these women may not be financially viable but it has a high social impact. This is because the primary trader women are the catalyst or key to improving the camel milk hygiene. This is based on the fact that they provide the motorbike riders and secondary trader with the plastic jerricans currently being used. They therefore serve as the quality control point for hygienic cans and milk.

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This implies that the camel milk solar kiosk at primary trader level should be in form of a public good or social enterprise investment. This is the underlying principle of Making Markets work for the Poor approach (M4P). M4P approach recognises that small scale traders at the bottom of the pyramid are dependent on market systems for their livelihoods. Influencing the market systems to work more effectively and sustainably for them means mitigating the entry barriers. In this case, the high capital investment required. By investing the IDEAS-LED grant at the primary trader level the county will be able to realise a high social impact due to improved camel milk hygiene and quality. The consultants recommends that the seed capital investment of Kshs. 56 Million be in the form of a social enterprise grant. The IDEAS-LED grant offer is therefore the best capital investment source as it requires no return on investment but it allows scaling up of the enterprises so as to realise better incomes for the women. The proposed asset investment will foster closer partnership between the community, private entrepreneurs and the county. In addition, the investment model suggested will allow transparent use of public resources that will in turn spur the local economic development of Wajir County.

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P a g e viii Abbreviations and Acronyms

ABBREVIATIONS AND ACRONYMS

ASAL	Arid and Semi-Arid Lands
BCR	Benefit Cost Ratio
BEP	Break Even Price
СА	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
ILRI-AVCD	International Livestock Research Institute-Accelerated Value Chain Development Project
IRR	Internal Rate of Return
KEBS	Kenya Bureau of Standards
Kgs	Kilogrammes
KRA	Kenya Revenue Authority
Kshs.	Kenya Shillings
LED	Local Economic Development
MoDP	Ministry of Devolution and Planning
NEMA	National Environmental Management Authority
NGOs	Non-Governmental Organisations
NNL	Nourishing Nomads Limited
NPV	Net Present Value
PPP	Public-Private Partnership
STE	Short Term Expert
TAT	Technical Assistance Team
ToR	Terms of Reference
VCA	Value Chain Analysis

1 INTRODUCTION

The global camel population is estimated to be more than 27 million animals with an annual growth rate of 3.4 percent (%). Eighty percent of camel herds are located in Africa with, 60% of these herds concentrated in the Horn of Africa. Camels are reared in arid and semi-arid areas where crop agriculture is severely limited and production of other livestock species is often challenged due to spatial and temporal distribution of rainfall. The anatomical and physiological adaptation of camels allow them to utilize low quality browse vegetation and convert it to high quality protein milk and meat products. The world human population is expected to reach 8.5 billion people by 2030, the livestock sector needs to diversify so as to be able to meet the increased nutrition and caloric demands. Diversification into camel products is seen as the next frontier in food production this is especially important for Sub-Saharan African countries whose land mass is predominately arid and semi-arid¹.

Camel milk differs from cow milk as it has lower lactose and fat content but higher levels of minerals and vitamins. Camel milk contains three times more vitamin C and 10 times more iron when compared to cow's milk. Camel milk has several medicinal benefits such as ability to improve AIDS and tuberculosis treatment outcomes, manage autism, reduce the amount of insulin used in diabetic patients, treat anaemia and lessens food and auto-immune allergic reactions². The composition and taste of camel milk depends on the type of browse feed consumed as well as availability of drinking water. Studies evaluating the water content in camel milk have shown that when camel cows have free access to water the water content of the milk averages 86% but when water is restricted the water content of milk rises to 91%. This means that during the dry season when ambient temperatures are high and water is scarce, the diluted milk makes an excellent food for the calf and by extension man³. 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). It is estimated that this population can produce 350 million litres of milk annually. However, current estimates indicate that annual camel milk production stands at 200 million liters and is valued at 2 billion Kenya Shillings (Kshs)⁴.

Camel livestock are an important livelihood asset that assures food and economic security during the dry/drought seasons. Camels are predominately reared by pastoralists that inhabit 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 population⁵. Wajir County is one of the 47 counties of Kenya located in the North Eastern region of the country. The county is predominately arid and covers a land surface area of 56,685.9 square kilometres (Km²) and lies between latitudes 3°N 60′ N and 0°20′ N and Longitudes 39 °E and 41 °E. The livestock sector is the mainstay of Wajir's economy. In 2013, the annual revenues generated from the livestock sector were estimated to be more than 120 million Kshs. The County has a livestock population of 3.5 million animals, of these, 533,651 are camels. The annual production of camel milk in the county is estimated to be 3,875,940 litres. However, the camel milk figures are grossly under represented as most camel milk is consumed at production level (80%) with only 20 % marketed through undocumented and unregulated informal channels at rural and Wajir town levels⁶.

1.1 BACKGROUND OF THE STUDY

The new constitution of Kenya introduced a devolved system that aims at improving governance, resource allocation and service delivery. To support the devolution process the European Union (EU) and the Ministry of Devolution and Planning (MoDP) have developed 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 capacity building activities for achievement of Local Economic Development (LED) at County level. The expected results of the programme includes;

(i) Improved national institutional capacities to support participatory and accountable fiscal decentralisation and

(ii) Increased capacity at County level to facilitate participatory planning and 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 the camel milk value chain through support of primary and secondary camel milk traders with construction of milk sheds, provision of milk cans and chilling equipments. The support will also involve training on General Hygienic Practices (GHP) when handling and transporting milk as well as value addition so as to reduce milk spoilage during the rainy season. 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 'contracting authority ') sought an independent Short-Term Expert (STE) (hereinafter the 'consultant') to carry out the technical assessment of the proposed project. The overall objective of the assignment was to clearly outline how the objectives 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 milk value chain analysis that describes the specific roles, benefits and constraints of the value chain actors.
- 2. 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 report on April 24th 2017;
- 2. Presentation of findings and recommendations to LED County Technical Team, MODP and EU TA in a dissemination meeting held on April 27th 2017 in Wajir town;
- 3. Submission to MODP and EU TAT the draft final report that has incorporated dissemination meeting stakeholder comments on 9th 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;

- Structured questionnaire interviews with 30 milk consumers, 10 women tea vendors, 5
 Public Service Vehicle (PSV) transporters and 3 producers.
- 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 (livestock and Veterinary Section) and department of Public Health, Medical Services and Sanitation. Kenya Bureau of Standards (KEBS), National Environment Management Authority (NEMA). NGOs interviewed included; Mercy Corps and ILRI-AVCD project. A KII was also held with a Private Social entrepreneur- Nourishing Normad Limited (NNL).
- 3. Focus Group Discussions (FGD) and observations were conducted during field visits with; Primary milk traders and motorbike transporters along the camel milk corridors of Griftu and Hadado and Secondary milk traders located at Soko Mjinga, Orahey and Griftu stage markets.

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 milk 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).

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Composition of the Evaluation Team

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

The dissemination meeting was held on April 27th 2017 in Wajir County, the STE presented her findings to the LED County Technical Team, MODP and EU TA. 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 camel milk VC. With regard to the IDEAS grant, the meeting resolved that investment in supporting the primary and secondary trader would be the most viable investment. The participants also agreed that public –private partnership (PPP) with Nourishing Nomad was also a viable venture. The meeting resolved that the suggested grant support to the fodder value chain was not feasible as there was no evidence that it would support the Camel milk VC.

2 **FINDINGS - VALUE CHAIN ANALYSIS**

Wajir County has the potential of meeting the current national daily demand for camel milk that stands at 20,000 litres a day even without any further investment in the sector. This translates to 7.2 million litres annually valued at 237 Million Kshs⁷. However, based on a 2016 report titled Mapping camel-milk corridors in Wajir County, only 10,000 litres of milk is traded daily within and around Wajir town⁸. Other studies conducted in Isiolo and Garissa counties indicate that only 12% of milk produced is marketed, the bulk of which is sold in raw form to consumers. The remaining (88%) is consumed by calves or utilised at household level as part of their daily food requirements with most milk produced during the dry season going to waste as camel producers have limited skills to convert the excess milk to products with longer shelf life that can be used during the dry/drought seasons. The current production level produces a daily average of 2 to 3 litres per animal over a lactation period of 9 to 10 months (sometimes 12 months) this is still far below the camel's production potential⁹. Figure 1 summarises the Camel Milk VC.

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Primary Camel Milk Traders

- Located at village level and managed by women
- Provide plastic containers to motorbike riders
- Trades daily with between 10 and 60 liters of milk
- Sale price: wet season Kshs. 60 to 70 Dry season Kshs. 80 to 90.

Motorbike Riders / Camel milk bulkers

- New enterprise entirely run by men
- Link producers to primary trader
- Collect and bulk milk from producers in faraway grazing areas
- Trade daily with approximately 120 liters of camel milk
- Sale price: wet season Kshs. 50 to 60, dry season Kshs. 70 to 80

Producers/Livestock keepers

- Most camel milk consumed at household level
- Production oriented to calf rearing
- Low output: 2 to 4 liters per animal
- Sell 10 to 20 liters of milk daily
- Sale price: Wet season Kshs. 30 to 40, dry season Kshs. 50 to 60.









Public Service Vehicle (PSV) Transporters

- > Includes buses, canters and vans
- > Milk is not a primary load
- > Transports milk at a fee charged to secondary traders
- Charges Kshs: 20L(50 to 100/-), 5L(20/-),3L(10/-)

Secondary Camel Milk Traders

- Operate by the roadside or open air markets within Wajir town at Griftu, Orahey & Soko Mjinga Markets.
- All traders are women
- Trade daily with 20 to 100 liters of camel milk Supplied by primary traders from more than three milk corridors routes
- Sale price: Wet season Kshs. 70 to 80, dry season Kshs. 100 to 120

Consumers

- Buys milk in cups(375mls), two cups (750mls) sold as 1 litre
- Buy camel milk for nutritional/medicinal benefits
- Concerned about unhygienic packaging in plastic containers & polythene bags that they associate with increased cancer cases.

Figure 1: Summary of the camel milk value chain actors and their roles

The purchase and sale price of camel milk is highly dependent on the season of the year (Figure 1). The monthly income also varies with the season, when the sale price and quantities of milk traded were averaged at each level of the value chain. It was found that the producer and primary traders earn the lowest monthly income. This is before the input cost is factored in. The motorbike rider and the secondary traders act like middle men and therefore earn the highest monthly income (Figure 2).



Figure 2: Seasonal Income for each Camel Milk VC level

Consumers

- Almost half (43%) of consumers interviewed purchased camel milk exclusively (Figure 3).
- The camel milk consumers were both male (37%) and female (63%) of an average age of 37 years and a range of 17 to 60 years.
- > Most camel milk consumers preferred raw camel milk that had not been boiled.
- > The main consumer concern was the use of plastic and polythene bags. The non-food grade plastic containers and polythene bags were associated with high milk spoilage

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rate and increased incidence of throat cancer. At village level, it was observed that most consumers carried their own stainless steel cans when purchasing milk (Figure 4).



Figure 3: Milk consumer purchasing preference

Most consumers (74%) identified camel yoghurt as the preferred new product they would like to see introduced in the market figure 7 below.

Figure 4: Consumer at Arbajahan village buying camel milk with their own stainless steel container



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Figure 5: Consumers response on the preferred new camel milk product

Government and Non-governmental (NGOs) Service Providers have been involved in various training interventions aimed at increasing milk production, improving milk hygiene and value addition through asset investment. Table 1 below summarises the role played by key institution that have previously supported the camel milk value chain (VC) in Wajir County.



Figure 6: Primary trader at Wagalla milk collection centre with a 500 litre capacity milk chilling equipment supported by VSF-Suisse and ADESO



Institution	Type of	Current				
	institution	Intervention				
Department of Agriculture Livestock and Fisheries and Agricultural Sector Development Support Programme (ASDSP)	Government	 Oversight and co-ordination role ensures interventions are no duplicated Offers technical assistance to government and NGO pro grammes ASDSP has previously hosted camel milk VC actors dialogue plat forms 				
ADESO and VSF-Suisse	NGO	 Although programmes have wound up. The two organisations played a critical role in training from producer to secondary trade levels on milk hygiene and value addition as well as invested in infrastructure such as milk sheds, aluminium milk cans and chilling facilities. They also linked producers and traders to markets and input sup pliers (veterinary drugs and equipment suppliers). 				
Mercy Corps	NGO	 Conducted camel milk VC and feasibility studies Trained primary and secondary trader groups on group governance and saving as well as co-funded asset investment. Currently mobilising and mapping primary and secondary traders who will be part of the supply chain for a privately owned came milk processing plant in Wajir town. 				

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LRI-AVCD project	Research	 Trained livestock keepers on proper animal husbandry including
	Institute	disease prevention, good breeding practices and grazing manage-
		ment.
Department of Public	Government	Implement and ensure adherence to the public health act that as-
lealth and Sanitation		certains that food intended for human consumption is of good
		quality from the farm to consumption level.
Kenya Bureau of Standards	Government	Has developed standards for;
KEBS)		Raw whole Camel milk KS 2061:2007 and
		Pasteurised camel milk KS 2062:2007
N <mark>ational</mark> Environmental	Government	Concerned with environmental impact of VC activities for exam-
Management Authority		ple the new ban on all plastics will have a far reaching effect on
		how processed camel milk will be packaged.
INEIVIA)		

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2.1.1 Opportunity for Private-Public Partnership (PPP)

A PPP is a partnership between the public sector and private sector for the purpose of delivering a project or a service traditionally provided by the public sector. PPPs main concept is that better value for money may be achieved through the exploitation of private sector competencies and the allocation of risk to the party best able to manage it. Nourishing Nomads Limited (NNL) is a private owned social-enterprise company. NNL plans to set up a camel milk processing and marketing company that will be based in Wajir town, the expected date of launch is January 2018. NNL is offering a new camel milk value chain channel that will run parallel to the existing informal channel. The NNL VC model will have milk collection points fitted with off the grid solar chilling equipments that have a 5,000 litre capacity. NNL will first invest in Hadado and Lagbogol milk routes, to this end NNL has partnered with Mercy Corps to identify primary and secondary trader women groups who will be willing to be dedicated NNL milk suppliers. The women groups will be trained on Good Hygienic Practices (GHP) when handling milk as well as supported with their own motor-bike transport for the case of the primary trader. The motorbike will source milk from previously selected NNL producers who will meet NNL GHP standards, these producers will have their herds supported with regular livestock husbandry extension services. In addition, at primary and secondary trader level, NNL will exchange the current plastic jerricans milk containers with aluminium milk cans of bearing the NNL logo.

NNL hopes that by paying a premium price on the same day for quality milk, more producers and primary traders will agree to be part of the supply chain partnership. The quality checked milk at village level will then be transported to the processing plant using an NNL chilled truck. The camel milk will then undergo pasteurization and packaging using KEBS certified food grade containers. The packaging of pasteurized camel milk will be of two types the first will be bulk packaging in 10 and 20 litres containers that a have an in-built tap to dispense the milk. This milk will be distributed to secondary traders who will have been previously supported with construction of milk selling points in and around Wajir town. The dedicated NNL secondary traders will be the



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main distribution channel for the pasteurized camel milk. Consumers buying milk from NNL secondary traders will come with their on food grade clear bottles or purchase them from the trader. The other packaging will be in form of the ordinary block milk carton pouches these will be supplied to retail shops and super-markets in and around Wajir town. NNL will also diversify its camel milk products through processing of camel yoghurt, flavoured milk and milk powder.

NNL has proposed the user fee PPP approach to gain entry into routes they will not be investing in. Under this approach, Wajir County will finance the construction of milk chilling points, NNL will then be assigned these chilling points to manage for a specific period of time for example 10 years, this will be under a concessionary agreement and after the expiry of given period the asset chilling point asset will be vested back to the County government. This type of methods is carried out under the BOT (Built, Operate and Transfer) approaches. During this concessionary period, the capital cost connected to the asset, maintenance cost and profits are recovered through user fees of the facility. Under this PPP management approach the county will increase its revenue base from revenues generated from the milk supplied to the chilling facility. The NNL PPP model thus meets the IDEAS programme objective as it will be able to; 1. Foster closer partnership between local community, county government, private investors and non-governmental organisations as well as allow a more transparent use of public resources. 2. Promote local economic development as this will be a new camel milk VC channel that will attract new entrepreneurs and businesses in the camel milk sector.

P a g e **14** 2 - Findings - Value Chain analysis

2.2 VALUE CHAIN CONSTRAINTS AND WAY FORWARD

The problem tree diagram in figure 8 summarises the main problem, underlying causes and resultant effects that are hindering the growth of the camel milk sector. Camel milk trading offers an alternative income to women in rural and urban areas. The average female camel produces five to ten times more milk than a cow under similar conditions due to a prolonged lactation length and consistent yield of milk even during stress periods (drought). The annual camel milk yield in Kenya is estimated to be 340 million litres valued at US\$ 100 million⁷. The lack of chilling facilities at primary and secondary trader levels and use of plastic non-food grade containers has been associated with the low quality of camel milk traded in Wajir County. The proposed interventions proposed by camel milk sector actors are highlighted in Figure 9. The interventions aim at improving the quality and hygiene of camel milk traded through trainings on GHP and equipment/asset support.

 $\label{eq:product} \mbox{P a g e 15} \\ \mbox{2 - Findings - Value Chain analysis} \\$

Low market penetration as consumers Consider the product Unhygienic Poor quality means that milk cannot withstand value addition processing such as

-Low incentive to Invest in the sector

-Low incentive to Adhere or implement set sanitary standards Lack of collective Action -VC actors cannot lobby for Improvement of key infrastructure such as construction of allweather roads

Effects

Causes

Low quality of Camel milk traded

Focal Problem

High milk spoilage due to Microbial contamination

Low quantity of milk taken to Market

Milk is collected and transported in nonfood grade plastic containers that are difficult to clean. Producer goal geared towards calf and meat production
Traditional rearing system characterised by high mobility (daily milk collection is difficult)
Most milk consumed at producer level

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Inadequate physical and institutional Infrastructure -Poor road network -Lack of integrations of all VC actors in collective action to lobby for investment in the Camel milk value chain.

Figure 8: Problem tree analysis summarising main constraints of camel milk sector

 $\label{eq:product} \mbox{P a g e 16} \\ \mbox{2 - Findings - Value Chain analysis} \\$



Figure 9: Proposed interventions to improve the hygiene quality of camel milk traded in Wajir County

3 FEASIBILITY STUDY

3.1 BACKGROUND

The business case for investing in the camel milk value chain in Wajir has been demonstrated before in published and unpublished reports. A 2016 mapping study constructed cost-benefit analysis (CBA) models using adjusted camel milk quantity, purchase and sale price information at primary and secondary trader levels. The CBA models analysed the financial impact of investing assets to improve hygiene and pasteurise camel milk based on three scenarios that is, handling 2,000; 1,000 and 500 litres of camel milk daily. In all the three scenarios, the cost of buying basic capital inputs to facilitate the enterprise including chest freezers, bulk pasteurizer, aluminium cans and low cost packaging and sealer were factored into the model. Financial outcomes such as Benefits/Cost (B/C) ratio: PVC = present value of costs: PVB = Present value of benefits: NPV = Net present value and IRR = Internal rate of return were determined for the 3 scenarios as shown in table 2 below.

 Table 2: Comparison of the three scenarios with regard to financial viability during the 2016 Mapping

 Camel Milk corridors Study

Scenario	Capital in-	Gross	NPV	B/C ratio	IRR
	vestment	margin			
2000 liters	1.6M	2.38M	5.7M	1.14	35-36%
1000 liters	1.2M	1.54M	2.9M	1.14	21-22%
500 liters	980,000	1.34M	2.8M	1.32	26-27%

In all 3 scenarios gross margins were found to be positive and significant, benefit/cost ratio were greater than 1 meaning the enterprise were breaking even and making profit. While the cumulative NPV= amount of money the investor would have at the end of the 1st year after recovering the investment cost was much higher compared to the money the investor originally invested in all scenarios. The IRR was higher than 20% in all scenarios, the low IRR for scenario 2 may have meant that the capital input was not being optimally utilized suggesting the need to increase the volume of milk traded so as to increase the profit margins. The feasibility assessment for the current assignment was carried out during the drought period. The value chain findings highlighted above indicate that the camel milk sector was still vibrant and resilient to drought shocks. These finding therefore provide a strong case to support the County

government request to invest in the camel milk value chain. Wajir County has proposed to invest part of the IDEAS grant to support the camel milk sector whose main problem is the low quality of camel milk traded due to unhygienic milk handling practices across all value chain levels. A SWOT analysis for the proposed undertaking is highlighted below;

Strengths

- There is a ready local market for camel milk, the daily demand is estimated to be close to 20,000 litres a day.
- Wajir County hosts the largest camel herd population in Kenya.
- Camel milk production is based on extensive use of natural rangelands making it a low input system thus can offer high margins of return for producers
- There is available human resource in form of women who are already involved in camel milk enterprises with an informal internal governance structure and social support system.
- Government and non-governmental service providers (NGOs) have implemented interventions whose best practices can be upscaled.
- > KEBS has published standards for pasteurised and raw camel milk.
- > The sector is now attracting private investors interest (Nourishing Nomads Limited) who are willing to engage in PPP and improve the livelihoods of VC actors.

Weaknesses

- Clan based milk marketing with most women operating in an individual capacity. Traders cannot leverage on the benefits of working in groups or cooperatives. Such as better bargaining power, spreading risks and pooling of resources to expand enterprises.
- There is lack of consumer awareness on the nutritional and health benefits of camel milk outside the nomadic community
- Use of plastic and polythene packaging to package or transport hot milk is unhygienic
 and linked to rising cases of throat cancer.
- > Lack of infrastructure (good roads and electricity) and equipments (non-spill milk cans)
- > Lack of technical skills for value addition of camel milk products especially during the wet season when there is a milk glut.

Opportunities

- > Increased funding support from government and non-governmental partners to support growth of local economies.
- Increasing demand for value added camel milk products –pasteurised milk, yoghurt, milk powder and ice-cream
- Camel milk dairy cooperatives or groups can spread the risk and allow pooling of resources to upscale production.

Threats

- > Social grouping-Clanism that hinders market to expand beyond ones clan
- > Competition from other dairy products (cow and goat).
- **Com**petition from other ASAL counties producing and selling camel milk.
- Social cultural misconception concerning camel milk by consumers who are not from nomadic communities.

3.2 BUSINESS PLAN

The enterprise/business will deal predominantly with supporting primary and secondary camel milk traders through capacity building and asset investment so as to promote hygienic trading of camel milk in the county.

Vision

To be the leading County in camel milk production and processing

Mission

To increase production of quality camel milk through training and adoption of assets that will reduce spoilage, improve hygiene and promote value addition.

Beneficiaries

- The main beneficiaries of the action will be the 30,000 women camel milk traders in Wajir County.
- County government will gain a new revenue stream from collection of user rent of the solar kiosks that are fitted with chilling and processing.
- The community will have a hygienic and safe product to consume

>

The private sector will be spurred to invest in partnerships with county government and communities in similar PPP user fee approach for other milk routes, or start enterprises such as processing plants to value add the camel milk product.

> Increased awareness and research on the health and nutritive benefits of camel meat.

Specific objectives and related activities

- To increase the daily quality and quantity of raw camel milk supplied to Wajir town from 10,000 litres to 20,000 litres within the 18 months of the IDEAS LED programme schedule.
- 2. To train primary and secondary camel milk traders on; (i) Good Hygienic Practices (GHP) when handling and trading with milk, (ii) Group formation and governance and (iii) Business skills particularly keeping of records and investing back gains to expand enterprise.
- 3. To capacity build Wagalla milk cooperative women group to produce KEBS certifiable value added camel milk products such as pasteurised milk and yoghurt.
- 4. To capacity build secondary traders to value add excess raw camel milk supplied through commercial fermentation of product into fermented milk (Susa) and yoghurt.

The proposed specific objectives will be actualised through the following activities;

- (1. Primary and secondary camel milk traders will first be mobilised to form groups (10 members). The grant will target to support fifteen (15) groups at primary trader level along the five (5) of the eight camel milk supply corridors and eight (8) groups at secondary trader level located in Ohaley, Griftu and Soko Mjinga markets. The groups will then be capacity build through training on GHP when handling and trading in milk, group formation and governance, business skill development with the aim of having them operate eventually as camel milk cooperatives and value addition of camel milk through pasteurisation and commercial fermentation into Susa and yoghurt.
- (2. Customise non-spill, aluminium milk of cans of various capacities (5, 10, 20, 25 and 50 Litres) to be given to primary and secondary traders in exchange for the plastic non-food grade jerricans that are currently being used. A total of 1,688 cans will be purchased, 1200 for primary traders and 488 for secondary traders.
- (3. Purchase and modify the carriers for fifteen (15) motorcycles that will be used to transporting 5 aluminium cans of 25 litres capacity from producers to primary trader.

- (4. Tender for innovative idea and construct twenty three (23) solar harvesting camel milk sheds/kiosks (15 at primary and 8 at secondary trader levels).
- (5. Purchase and install in the newly constructed solar kiosks thirty (30) off the grid solar powered chest freezers for the primary traders and 8 automatic milk dispensing machines with chilling and back up battery capacity at secondary trader level.
- (6. Purchase and install at Wagalla milk cooperative existing milk shed a 200 litre batch pasteuriser, water chiller and manual food grade plastic container packaging and sealing machine.

3.3 PRODUCTION PLAN

Products

The main product to be traded will be raw chilled camel milk, other value added products will include minimum processing of camel milk (High-Temperature, Short-Time (HTST) pasteurization of milk at 72 degree centigrade (°C) for at least 15 seconds. This HTST milk will then be value added to camel milk candy, commercially fermented camel milk (Susa) and yoghurt.

Production inputs

The dissemination meeting resolution was that investment should be done in 5 of the 8 camel milk corridor routes previously identified. The main County investment will be setting up of Camel milk solar chilling and bulking kiosks. The kiosks will be managed by either a group of 10 women at both Primary and Secondary trader levels or the private entrepreneur NNL. During budgeting funds will be set aside to tender and request for designs of low cost solar harvesting kiosks as well as innovative non-spill aluminium milk cans. The tender selection criteria will prioritise tenders from innovators based in Wajir County and if none are available request will be made to include other regions of the country.

The fully equipped camel milk solar chilling and bulking kiosks will have the following assets;

1. Modular Kiosk designed with work benches and water supply (Figure 10), the kiosks will be fitted with solar panels so as to allow harvesting of the sun's energy. The photovoltaic capacity of these panels and back up battery capacity should be able to power 2 solar powered chest freezers each of 225 litre capacity.

- 2. Two Solar powered chest freezers (Figure 11) each of 225 litre capacity will be invested at primary trader level and sourced from a Kenyan dealer so as to ensure maintenance sustainability.
- 3. Non-spill Aluminium cans (8 cans of various capacity for each woman trader), proposed sizes include 5,10,20,25 and 50 litres (only for secondary trader level). The 25 litre cans will be dedicated for transportation (From producer and to secondary traders in Wajir town)
- Motorbike with a canvas carrier that will be used to transport to the primary trader the 25 litres cans after bulking at producer level. This will be given to each primary trader group (Figure 12).
- 5. Automatic milk dispensing machines (150- 500 litres) that chill milk to 2-4°C, the machines will also have an in built power back up battery system (22 hours). This asset will be invested at secondary trader level (Figure 13).







Figure 10: Proposed innovative design of a solar kiosk currently in the market (Picture source green hub Sustainable Construction Company <u>contact@greenhub.co.ke</u>)

Figure 11: Solar Fridges and Freezers currently available in the market (picture source solar world Kenya website <u>http://www.solarworld.co.ke/solarfreezer.html</u>)

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Figure 12: Canvas carriers to be used to transport the 25 litre aluminium cans (Source Dr. Simon Kuria)



Figure 13: Automatic Milk dispensing machine locally available (Picture source http://www.milkatmkenya.com/)

Bulk pasteuriser and water chiller (200L capacity) that are gas or electric powered as well as a manual milk packaging machine at Wagalla milk cooperative milk shed (Figure 14).

Figure 14: Batch milk pasteuriser and water chiller and manual operated cup packaging and sealing machine (Source <u>http://www.maxtektechnology.com/</u>)



Production channels

There will be two production channels;

1. The PPP channel (Figure 15) with Nourishing Nomads Limited (NNL)

The County will invest in fully equipped solar chilling and bulking kiosks at primary trader level and hand over the management and maintenance of these kiosks to NNL. The county will agree on a 70 (NNL) to 30% (County) revenue sharing contractual agreement for a specified period of time for example 5 years.

2. The informal channel with Primary and Secondary camel milk traders

The County will aim at improvement of this channel through asset support to ensure milk hygiene, the women traders will in turn pay a user fee to the county while they manage the enterprise (Figure 16).

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Figure 15: PPP camel milk production channel

2. The informal channel – County will aim at improvement of this channel through asset support to ensure milk hygiene (Figure 16).

0 Figure 16: Informal camel milk production channel PSV transporter (Matatu) Motor bike rider Primary trader Solar Kiosk Secondary trader Consumers Kshs. 50 for 25 litre can with canvas bag (chilling and bulking Solar kiosk chilling brings their own milk can (125 L) (500 L) and automatic maor buy the food grade chine dispenser plastic container

Licensing and Legal requirements

- The first step in the production process will be acquiring land from the county, this will be at no cost as the county's land mass is expansive and most of it is still held in trust by the county. Relevant County department (public health and public works) will be sought to approve constructions of the kiosks. The kiosks are not permanent structures hence will require less permits and regulations. Once
- Training of women groups to ensure adherence to the existing KEBS standard (KS 2061:2007) specifications for raw whole camel milk and (KS 2062: 2007) for pasteurised camel milk. The business will ensure that all annual requirements for personnel and business licensing are acquired and renewed for example all staff (including the women processors will require a public health certificate). KEBS certification for pasteurised milk and yoghurt produced at Wagalla cooperative level will be applied for. However, the group is also required to have a KRA pin certificate. The Wagalla group will be assisted to apply for the KRA pin as well as request for a tax waiver for the group as it will run as a social enterprise.

3.4 CAMEL MILK SOLAR KIOSK MANAGEMENT

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 at the livestock section is composed of only 7 technical personnel who are already too few to serve the county needs. The management of the camel milk solar kiosks will be carried out by women groups or the private entrepreneur (NNL). At primary trader level at least one of the two or three kiosks will be managed by the private entrepreneur NNL through a user fee PPP approach where the county collects user fee revenue once the cost of maintenance and operation are deducted this can be on monthly, quarterly or annual basis in a70% (NNL) – 30%(county-livestock section) sharing contractual agreement. The management agreement with the women traders at primary level will be in the form of tenant lease model (Table 3) where the women will pay monthly rent for use of the solar kiosk. The cost of maintaining the kiosk and equipments at the primary trader level in the first year will be bore by the County government there after the women will be expected to cost share the maintenance cost after the first year.

At secondary trader level all 3 kiosks will be run by women groups in a tenant lease agreement (Table 4), the maintenance cost just like the primary trader will be cost shared after the first year. Capacity building on business skill development and GHP during milk handling will be critical to ensure women are successful in running the solar camel milk kiosk enterprises. However, the county (livestock section staff) lack human resource capacity to conduct these trainings and part of the grant will be allocated towards awarding short term consultants to carry out the trainings. The consultants selected should have prior traction/success in similar training in the county for example VSF-Suisse/ADESO and Mercy Corps.

3.5 MARKETING PLAN

Target Market

The main target market for the raw whole camel milk is Wajir town and its environs, the current market demand stands at 20,000 litres a day. The pasteurised camel milk and yoghurt from Wagalla milk traders will be hygienically packaged and will be KEBS certified. The main market outlet for the KEBS certified products will be the grocery retail shops and supermarkets within Wajir town.

Promotion strategy

The first marketing strategy will be the creation of awareness amongst Wajir town consumers on the availability of the improved hygienic raw camel milk product. This will be done through barazars and local radio advertisements.

Pricing

The current pricing fluctuates with the season, to ensure proper planning of business activities. It is proposed that a price be set for the purchase and sale price of the raw whole camel milk (Figure 17). The proposed prices was arrived at by averaging the various amounts mentioned by the VC actors during the current assignment. Secondary literature was also used to ensure the price is a reflection of the industry sector^{9.} The primary trader will sell on a daily basis 500 litres of raw camel milk to the secondary trader while the secondary trader will sell 1500 litres of raw milk and 100 litres of yoghurt daily. The Wagalla milk cooperatives will pasteurise daily 200 litres of camel milk which they will package in 500 mls containers (350) for fresh milk and 250 mls containers (50) for yoghurt. The introductory price of the processed camel milk products are highlighter in figure 17.





Competition

Camel milk is used at household level to make tea or drank raw (unboiled) as part of a meal or snack. Competition will be from other livestock milk products, specifically goat milk as it is the preferred milk used by households to make tea. Consumers prefer to drink camel milk that is raw, providing the women with chilling facility and hygienic milk cans will see a growing customer base of health conscious consumers who previously were not purchasing the milk because of it low hygienic quality. The KEBS certification of the pasteurised milk and yoghurt product from Wagalla milk traders will allow it to compete with cow milk and yoghurt in outlets such as supermarkets and hotels. There is currently no supplier of pasteurised and packaged camel milk and yoghurt in Wajir County, this means that the processed product will enjoy monopoly unlike the cow pasteurised milk and yoghurt that are supplied by 3 or 4 competing national level milk processors.

3.6 FINANCIAL PLAN – CASH FLOW STATEMENTS

The proposed capital investment for the fully equipped camel milk solar chilling and bulking kiosk was arrived during discussions held during the dissemination meeting. The proposed enterprise venture will require a seed capital investment of Kshs. 56,318,040.00 this is 51.2% of the total 110 million IDEAS grant amount. 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 at both the primary (Table3) and secondary (Table 4) traders levels.

	Tab	le 3: Cash flow p	rojections for th	e Primary Cam	el m <mark>ilk trader</mark>			
Primary Trader Cash flow projections								
		2018	2019	2020	2021	2022	2023	2024
Capital Expenditure								
Dedicated Motorcycle with canvas bag	<u>3000000</u>							
Solar milk Kiosk	7500000	_						
Solar powered chest Freezers	10,800,000							
Bulk pasteuriser, chiller and manual cup packaging machine	770,000							
Aluminium cans various sizes	4,868,400							
Total - Capex	<mark>26,938,40</mark> 0							
2 months Total opex	3,120,000							
Maintenance of chest frezer@120,000/5years	600,000							
Solar kiosk revenue collec- tor@360,000/5yrs	1,800,000							
Maintenance solar milk ki- osk@120,00/5years	600,000							
Total seed grant required	33,058,400							
Incomes								
Income - Sale of raw milk Wajir town (500L)@100/L		18,000,000	18,900,000	19,845,000	20,837,250	21,879,113	22,973,068	24,121,722
Income - Sale of raw milk local (100L)@80/L		2,880,000	3,024,000	3,175,200	3,333,960	3,500,658	3,675,691	3,859,475

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Wagalla Income sale pasteurised milk and yoghurt (200L) @ 400/L	28,800,000	30,240,000	31,752,000	33,339,600	35,006,580	36,756,909	38,594,754
Income - Sale of fermented/Susa milk lo- cal (20L)@90/L	648,000	680,400	714,420	750,141	787,648	827,030	868,382
Total Income	50,328,000	52,844,400	55,486,620	58,260,951	61,173,999	64,232,698	67,444,333
							<u>Expenses</u>
Maintenance of chest freezer /pasteuriser	-	60,000	60,000	60,000	60,000	60,000	60,000
Maintenance of solar kiosk	-	120,000	120,000	120,000	120,000	120,000	120,000
<u>Total - Opex</u>	-	180,000	180,000	180,000	180,000	180,000	180,000
Total - Opex	-	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00
Operating Expenses	۲						
Commercial fermenting cultures/	15,000	15,450	15,914	16,391	16,883	17,389	17,911
Platform test equipments (alcohol rea- gent)	50,000	51,500	53,045	54,636	56,275	57,964	59,703
Food grade 1 litre bottles @30 (90,000/yr.)	2,700,000	2,754,000	2,809,080	2,865,262	2,922,567	2,981,018	3,040,639
Pu <mark>rchase of (620</mark> litres/day)	15,624,000	16,405,200	17,225,460	18,086,733	18,991,070	19,940,623	20,937,654
Night Guard@3,000/month	36,000	39,600	43,560	47,916	52,708	57,978	63,776
Water bill and Rent	150,000	154,500	159,135	163,909	168,826	173,891	179,108
Total for OpEx	18,575,000	19,420,250	20,306,194	21,234,847	22,208,328	23,228,864	24,298,790
Total costs	18,575,000.00	19,480,250.00	20,366,193.50	21,294,846.91	22,268,328.48	23,288,863.59	24,358,790.26

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					La income	
		@70% of profit	Annual Member payment	ber pay out	Earnings	8
oss Profit / Loss Year 1	31,753,000	22,227,100	2,222,710	185,226	9,525,900	
	22.244.452	22.270.005	2 227 004	402.024	0.070.045	
oss Profit / Loss Year 2	33,244,150	23,270,905	2,327,091	193,924	9,973,245	
oss Profit / Loss Year 3	35,000,427	24,500,299	2,450,030	204,169	10,500,128	
an Dan fit / Loan Voor A	36 846 104	25 792 273	2 579 227	214 936	11 053 831	
ss Profit / Loss Year 4	50,040,104	23,132,213	2,373,227	214,550	11,055,051	
ss Profit / Loss Year 5	38,785,670	27,149,969	2,714,997	226,250	11,635,701	
iss Profit / Loss Year 6	40,823,835	28,576,684	2,857,668	238,139	12,247,150	
iss Profit / Loss Vear 7	42,965,543	30,075,880	3,007,588	250,632	12,889,663	

	TUDIE	e 4: Cush jiow p	rojections jor t	the secondary of	Lamer milk trad	ler		
		Sec	ondary Trader Cas	sh flow projections	<u>s</u>			
	Seed Capital	2018	2019	2020	2021	2022	2023	2024
Capital Expenditure								
Tuktuk Maziwa	741000							
Solar milk Kiosk	<u>4,000,000</u>							
Solar powered Automatic milk dis- penser	2,000,000							
Aluminium cans various sizes	1,698,640					0		
<u>Total - Capex</u>	8,439,640							
2 months Total opex	11,820,000							
Maintenance of ATM@120,000/5years	600,000							
Solar kiosk revenue collec- tor@360,000/5yrs	1,800,000	CT K					1	
Maintenance solar milk ki- osk@120,00/5years	600,000							
Total seed grant required	23,259,640							
Incomes								
Income - Sale of raw milk Wajir town (1500L)		81,000,000	85,050,000	89,302,500	93,767,625	98,456,006	103,378,807	108,547,747
Income - Sale of yoghurt (100L)		7,200,000	7,560,000	7,938,000	8,334,900	8,751,645	9,189,227	9,648,689
Total Income		88,200,000	92,610,000	97,240,500	102,102,525	107,207,651	112,568,034	118,196,436

Table 4: Cash flow projections for the Secondary Camel milk trader

<u>Expenses</u>							
Maintenance of Milk ATM	-	60,000	60,000	60,000	60,000	60,000	60,000
Maintenance of solar kiosk	-	120,000	120,000	120,000	120,000	120,000	120,000
<u>Total - OpEx</u>	-	180,000	180,000	180,000	180,000	180,000	180,000
Operating Expenses							
Commercial fermenting cultures/	15,000	15,450	15,914	16,391	16,883	17,389	17,911
Platform test equipments (alcohol reagent)	25,000	25,750	26,523	27,318	28,138	28,982	29 <mark>,851</mark>
Food grade 1 litre bottles @30 (360,000 bottles/yr)	10,800,000	11,016,000	11,236,320	11,461,046	11,690,267	11,924,073	12,162,554
Purchase of (1600 litres/day)@100	57,600,000	60,480,000	63,504,000	66,679,200	70,013,160	73,5 <mark>13,818</mark>	77,189,509
Night Guard@3,000/month	36,000	39,600	43,560	47,916	52,708	57,978	63,776
Water bill and Rent	150,000	154,500	159,135	163,909	168,826	173,891	179,108
Total for OpEx	68,626,000	71,731,300	74,985,451	78,395,781	81,969,982	85,716,131	89,642,709
		Dividends @70% of profit	Annual Member payment	Monthly mem- ber pay out	Retained Earn- ings		
Gross Profit / Loss Year 1	19,574,000	13,701,800	1,370,180	114,182	5,872,200		
Gross Profit / Loss Year 2	20,69 <mark>8,700</mark>	14,489,090	1,448,909	120,742	6,209,610		
Gross Profit / Loss Year 3	22,075,049	15,452,534	1,545,253	128,771	6,622,515		
Gross Profit / Loss Year 4	23,5 <mark>26,74</mark> 4	16,468,721	1,646,872	137,239	7,058,023		
Gross Profit / Loss Year 5	25,057,670	17,540,369	1,754,037	146,170	7,517,301		
Gross Profit / Loss Year 6	2 <mark>6,671,903</mark>	18,670,332	1,867,033	155,586	8,001,571		
Gross Profit / Loss Year 7	28,373,726	19,861,608	1,986,161	165,513	8,512,118		

3.7 FINANCIAL ANALYSIS

The financial viability for the camel milk solar kiosks was determined using the following financial viability indicators;

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

Primary trader level

The net present value (NPV) for the camel milk enterprise of primary trade is negative, the internal rate of return (IRR) is less than the cost of capital and the benefit cost ratio (BCR) is negative (Table 5). The investment criteria with regard to NPV, BCR and IRR is to invest whenever NPV is positive, BCR is at least 1 and IRR is greater than the cost of capital. Therefore the proposed business does not meet any of the three criteria as the return on capital investment is too high compared to the benefits. Therefore the proposed milk business at the primary trader level is not worth investing as proposed, unless the capital investment cost are reduced and there is increased quantity of milk purchased from producers and sold to secondary traders.

	Table 5: Primary trader Camel milk financial viability										
Year	Discounted Income (DI)	Discounted Cost (DC)	Gross Present Value (GPV)								
1	18,801,747	16,222,707	2,579,039								
2	17,241,776	14,950,325	2,291,451								
3	15,811,236	13,647,239	2,163,997								
4	14,499,387	12,459,282	2,040,104								
5	13,296,381	11,376,122	1,920,259								
6	12,193,188	10,388,370	1,804,817								
7	11,181,526	9,487,495	1,694,031								
Total	103,025,241	88,531,541	14,493,699								
Capita inve	stment		32,288,400								
NPV		No. of the second se	(17,794,701)								
BCR			-0.20								
IRR			< 14.50%								
Discounting	g rate		14.50%								

Further analysis was carried out to assess if reducing the capital cost at primary trader level would result in the business becoming a viable venture. Capital cost of motorcycle purchase and reducing the routes invested from 5 to 2 scenario was analysed for. The reduction of capital cost did not change the viability of the primary trader business see table 6, IRR and NPV were still negative, however NPV reduced from 17 Million to 6 million.

 Table 6: Primary trader business viability when motorcycle purchase cost is not costed and

 Investment routes are reduced

Year	Discounted Income	(DI) Di	scounted Cost (DC)	Gross Present Value (GPV)
0		0	0	0
1	18,801	,747	16,222,707	2,579,039
2	17,241	,776	14,85 <mark>8,794</mark>	2,382,983
3	15,811	,236	13,567,299	2,243,937
4	14,499	,387	12,389,466	2,109,921
5	13,296	,381	11,315,147	1,981,234
6	12,193	,188	10,335,117	1,858,071
7	11,181	,526	9,440,985	1,740,541
Total	103,025	,241	88,129,514	14,895,726
Capita	l investment			18,867,360
NPV				(3,971,633.68)
BCR				(0.05)
IRR				< 14.5
Discou	inting rate			14.50%

Why was the Gross Profit for primary trader positive while NPV was negative?

Gross Profit Analysis (GPA) and NPV measure the viability of businesses. However, GPA has two weakness: i) it does not consider capital investment; and ii) it does not consider time value of money. This explains why the projected gross profit for primary traders is positive. NPV corrects for the weakness inherent in GPA by discounting income and cost of an enterprise over time enabling them to be compared in the present time. Further, NPV nets out capital investment from the gross present value resulting to net income of the enterprise in present time. These two considerations makes NPV more powerful in assessing the financial status of an enterprise and making investment decisions. Therefore, whenever the two methods are used together, as is the case in this study, the results of the NPV analysis supersede those of the GPA. Consequently, the recommendations by this study regarding investing in primary milk traders are based on the NPV, BCR and IRR analyses and not the GPA.

Table 7: Primary trader Break-even analysis price											
Year	Fixed cost(FC)	Litres sold/Yr	FC/L	Total variable cost(TVC)	VC/L	BEP(FC/L+VC/L)					
1	32,288,400	223,200	145	18,575,000	83	228					
2	0	234,360	0	19,600,250	84	84					
3	0	246,078	0	20,486,194	83	83					
4	0	258,382	0	21,41 <mark>4,847</mark>	83	83					
5	0	271,301	0	22,388,328	83	83					
6	0	284,866	0	23,408,864	82	82					
7	0	299,109	0	24,478,790	82	82					

Break- even price analysis

Assumptions:

1. Capital investment is recovered in the first year

2. Analysis does not differentiate the products sold

The selling break- even price (BEP) for 1 litre of milk in the first year of business is Kshs. 228 this is higher than what was proposed (Kshs100) by the VC stakeholders. The BEP declines to Kshs. 84 in the second year (Table 7). The price remains constant in the 3rd to 5th years of business at Kshs. 83 after which, it declines further to Kshs. 82. This means that in the first year, the business will make a loss of about 153% given the proposed average selling price of Kshs. 90 for the different products. The implication of the projected BEP is that the fixed costs and operational costs are too high compared to the suggested production and sales levels and in the long run, the business will make losses. Table 8 presents a scenario where the fixed costs are recovered in four years. This will give a BEP of Kshs. 119 in the first year and a steady decline in BEP to reach Kshs. 82 by the 7th year. The reducing BEP trend is desirable for food based products.

	Table 8: Primary trader break-even price with fixed cost spread over 4 years												
Year	Fixed cost(FC)	Litres sold/Yr	FC/L	Total variable cost(TVC)	VC/L	BEP(FC/L+VC/L)							
1	8,072,100	223,200	36	18,575,000	83	119							
2	8,072,100	234,360	34	19,600,250	84	118							
3	8,072,100	246,078	33	20,486,194	83	116							
4	8,072,100	258,382	31	21,414,847	83	114							
5	0	271,301	0	22,388,328	83	83							
6	0	284,866	0	23,408,864	82	82							
7	0	299,109	0	24,478,790	82	82							

Secondary trader level

The net present value (NPV) for the milk enterprise is positive while the internal rate of return (IRR) is greater than cost of capital (Table 9). The investment criteria with regard to NPV and IRR is to invest whenever NPV is positive and IRR is greater than the cost of capital. The proposed milk business meets the two criteria and therefore it is profitable to invest in it. The benefit cost ratio (BCR) of 0.23 is far below the recommended ratio of at least 1 suggesting that the cost of running the milk business is unacceptable.

Therefore, it is recommended that the entrepreneur should implement swift measure to reduce the cost of operation while increasing production and sales. Lending rate Interests rates fluctuate in a normal financial market in case of a decrease (10%) or increase (20%) NPV would remain positive in both instances but the BCR would still be less than 1 (Table 9). The implication is that, the projected revenue from the proposed business is stable even if lending rates are to fluctuate. The BCR findings also suggest that the investor should seek cheaper source(s) of capital to finance the business.

Year	Discounted Income (DI)	Discounted Cost (DC)	Gross Present Value (GPV)
1	77,030,568	59,935,371	17,095,197
2	70,639,385	54,851,204	15,788,181
3	64,778,476	50,072,792	14,705,684
4	59,403,842	45,715,846	13,687,997
5	54,475,139	41,742,652	12,732,487
6	49,955,368	38,118,928	11,836,439
7	45,810,599	34,813,504	10,997,095
Total	<mark>4</mark> 22,093,377	325,250,298	96,843,079
Capital investment			23,259,640
NPV			73,583,439
BCR			0.23
IRR			89%
Discounting rate			14.50%
Varying discount rate	10%	14.5%	20%
NPV	89,470,306	73,583,439	58,467,950
BCR	0.24	0.23	0.21

Table 9. Secondar	v trader Came	Imilk	financial	l viahilit
TUDIE J. JECOTIUUT	y li uuci cuille	1 1 I III K	mancia	VIUDIIIL

Break-even price analysis

	Table 10: Secondary camel milk trader Break-even price analysis												
Year	Fixed cost	Litres	Fixed/L	Variable Cost	VC/bottle	BEP (FC/L+VC/L)							
		sold/yr		(VC)									
1	23,259,640	576,000	40	68,626,000	119	160							
2	0	576,000	0	71,911,300	125	125							
3	0	576,000	0	75,165,451	130	130							
4	0	576,000	0	78,575,781	136	136							
5	0	576,000	0	82,149,982	143	143							
6	0	576,000	0	85,896,131	149	149							
7	0	576,000	0	89,822,709	156	156							

Assumptions:

- 1. Capital investment is recovered in the first year
- 2. Units produced are constant

3. Analysis does not differentiate the products sold

The selling break-even price (BEP) for a litre of milk at secondary trader level in the first year of business is Kshs. 160 which is less by Kshs. 10 from what was proposed in the business plan. In the second year the BEP declines to Kshs. 125 but increases thereafter through the entire period of the projected period (Table 10). This implies that the suggested selling price of Kshs. 150 is below the BEP and the business would make losses in years 1 and 5-7. However, the suggested selling price of Kshs. 200 for 500mls of pasteurised camel milk and 250mls for yoghurt will attract profit during the entire period of the business. The unfavourable observation on selling raw milk is due to three reasons, fixed cost is recovered in year one, units sold are constant over the period of this projection and operation costs are increasing (Table 10). This trend has the potential of reducing sales in the long run 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 milk declines over time. Several options are available for the company to achieve the reducing BEP including increasing units sold and spreading the fixed costs over time. Table 11 presents such a scenario where fixed cost is spread over four years and units of raw milk sold increase by 5% annually. The initial BEP for raw milk will move from Kshs. 129 to Kshs. 116 representing a 9% decrease in BEP by the 7th year of operation.

	Table 11: Sec	condary trade	r break-even	pric <mark>e with fixed</mark> co	ost sp <mark>rea</mark> d over 4	<mark>years</mark>
Year	Fixed cost	Litres sold/yr	Fixed/L	Variable Cost (VC)	VC/bottle	BEP (FC/L+VC/L)
1	5,814,910	576,000	10	68,626,000	119	129
2	5,814,910	604,800	10	71,911,300	119	129
3	5,814,910	635,040	9	75,165,451	118	128
4	5,814,910	666,792	9	78,575,781	118	127
5	0	700,132	0	82,149,982	117	117
6	0	735,138	0	85,896,131	117	117
7	0	771,895	0	89,822,709	116	

Assumptions:

1. Fixed cost is recovered in four years

2. Units sold increase by 5% annually

3. The analysis doesn't differentiate the products sold

3.7.1 Recommendation

The financial analysis indicate that the initial entry with capital assets will be too costly to expect return on investment especially at the primary trader level. Although the women trading groups will pay monthly rent from their earnings the annual profit sharing that will go towards paying back the capital investment will not be feasible. This implies that the camel milk solar kiosk should be in form of a public good or social enterprise investment. This is the underlying principle of Making Markets work for the Poor approach (M4P). M4P approach recognises that small scale traders at the bottom of the pyramid are dependent on market systems for their livelihoods, influencing market systems to work more effectively and sustainably for them means mitigating the entry barriers in this case the high capital investment required. By investing the IDEAS-LED grant in the fully equipped camel milk solar kiosks the county government will act as a catalyst that will allow women traders provide a the market with a product that is

hygienic and that has a high market demand. This will translate to improved household income for the women, better health for consumers and economic growth for the Wajir County.

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3.8 RISK ANALYSIS

The table below gives a breakdown of the possible risks to be encountered their description and the mitigation measures.

Type of risk	Description	Mitigation strategy
Environment risk	Wet season price milk glut results	Plan ahead through identification of a
Erratic supply of milk re-	in lower prices while dry season	dedicated producer and primary
sulting in high seasonal	results in higher prices hike and	trader whose purchase price has been
fluctuations of milk pur-	low supply of animals in the mar-	previously negotiated.
chase and selling prices	ket	
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.

3.9 ENVIRONMENTAL ISSUE

The proposed camel milk solar kiosks will be designed so as to harvest the sun's energy, the green energy source will reduce harmful emissions generated by the diesel run generators currently being used to generate electricity for the county. The county had proposed to have secondary women traders' package milk in low cost soft pouches of various sizes, however, following the Gazette notice No. 2334, of 28th February, 2017, the Cabinet Secretary, Ministry of Environment and Natural resources while enforcing the Environmental Management and Coordination Act (EMCA Cap 387), announced a complete ban of all forms of plastic bags. This ban includes soft pouch plastic bags used to package milk. This has meant that the camel milk enterprises will use food grade plastic bottles approved by KEBS to dispense milk. Another environmental issue of concern will arise from swapping of containers from the non-food grade jerricans to aluminium cans.

The plastic jerricans will be dumped in the environment, the County will have the responsibility to ensure that these plastic jerricans do not contaminate the environment by mobilising resources from partners to recycle the plastics through an innovative approach (Annex 2). The innovative recycling process converts polythene/plastic waste through a closed circuit heat

treatment process that has a conversion rate of above 90%. The plastic waste loaded in the furnace is converted into gaseous fuel known as CPG (Compressed Petroleum Gas) and liquid crude fuels which can be used to run motorcycles. The recycling process has negligible air emissions if at all.

3.10 IMPLEMENTATION SCHEDULE

The construction of the camel milk solar kiosk and fully equipping them will not take more than 6 months. Before the grant contract is effected the county should ensure the following preimplementation activities are in place.

Pre-project Activities Includes seeking:

1. Approval for solar kiosk construction from competent authorities with respect to: Environmental clearance-NEMA

Construction –county department of Roads, Transport and Public Works

Sanction and supply of water- county 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.
- 3. Advanced tender floating for innovative design and build of solar kiosks.
- Tender for suppliers (see attached list of equipment annex 1) quotations for non-spill aluminium, chest freezers and automatic milk dispensing machine and motorbike canvas carriers (find in Annex 2 the preferred list of suppliers).
- 5. Advanced call for short term consultancy services to mobilise groups and capacity build on group governance and business skill development.

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. Design and build camel milk																		
solar kiosks																		9
2. Contract short term service																		
providers to mobilise and train																		
camel milk trader groups at																		
primary and secondary levels						6												
3. Installation of equipments									165			-						
an <mark>d mach</mark> inery in the newly																		
constructed Solar kiosk				(
4. Commissioning of solar kiosk																		
operations																		

The Gantt chart given below shows the activity implementation schedule:

CONCLUSIONS AND RECOMMENDATIONS

The main challenge hindering the scaling up of the camel milk value chain is the lack of adherence to the KEBS standard on pasteurised and raw whole camel milk. The most critical being Good Hygienic Practices (GHP) when handling milk across all levels of the value chain. It was noted that despite the drought the camel milk trade in Wajir town was still vibrant and resilient to the drought shocks. To address the main problem of low quality of camel milk due to poor hygiene, the county will support the design and construction of 23 fully equipped camel milk solar chilling and bulking kiosks. The proposed enterprise venture will require a seed capital investment of Kshs. 56,318,040.00 (51.2% of the total 110 million) IDEAS-LED grant amount. Each solar kiosk will be designed using innovative idea to ensure there is harvesting of the sun's energy. The solar power will then light the kiosk and run at primary trader level a total of 30 solar powered chest freezers and 8 automatic milk dispensing machines at secondary trader level. The kiosks will be constructed in 5 camel milk corridor routes so as to ensure equal resource allocation. Two management models are proposed the first is to build and rent the kiosks in a tenant-lease arrangement with the primary and secondary traders. The second model is a public-private partnership with a private entrepreneur, Nourishing Nomads Limited (NNL), the county will build and equip the solar kiosks and NNL will manage and maintain the asset for an agreed period of time, the revenue generated will then be shared with the county in a70% (NNL); 30%(county-livestock section) sharing agreement.

The business case for the camel milk chilling and bulking kiosk at the primary trader level when evaluated on the basis of the Gross Profit Analysis (GPA) made profits throughout the 7 year evaluation period. However, when analysis discounted income and cost of the enterprise over time so as to take care of return on capital investment in the present time. The net present value (NPV) was negative at Kshs. 17,794,701 against a capital investment Kshs. 33,058,400. The internal rate of return (IRR) and benefit cost ratio (BCR) also had negative values. This means that investment of kiosks at the primary trader level will not be commercially viable. However, benefits accrued to supporting these women may not be financially viable but they have a high social impact. This is because the primary trader level, the women are the catalyst or key to improving the camel milk hygiene.

This is based on the fact that they provide the motorbike riders and secondary traders with the plastic jerricans currently being used. They therefore serve as the quality control point for hygienic cans and milk. This implies that the camel milk solar kiosk support at primary trader level should be in form of a public good or social enterprise investment. This is the underlying principle of Making Markets work for the Poor approach (M4P). M4P approach recognises that small scale traders at the bottom of the pyramid are dependent on market systems for their livelihoods. Influencing the market systems to work more effectively and sustainably for them means mitigating the entry barriers. In this case, the high capital investment cost required. By investing the IDEAS-LED grant at the primary trader level the county will be able to ensure a high social impact due to the improved camel milk hygiene. Given that there is a strong social reason to invest at the primary trader level. The break-even price analysis indicated that when the fixed cost recovery were spread over the first four years the primary trader could sell a litre of milk at Kshs. 119 instead of the proposed Kshs. 100 that will result in losses due to high fixed and operation costs. The BEP price would then gradually decrease and by the 7th year it would be Kshs. 82.

A capital investment of Kshs. 23,259,640 at the secondary trader level yields an Internal Rate of Return (IRR) of 89% and a positive Net Present Value (NPV) of Kshs. 73,583,439. 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 0.23 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. The break-even price (BEP) for a litre of milk at secondary trader level in the first year of business is Kshs. 160 which is less by Kshs. 10 from what was proposed in the business plan indicating the business will make losses if it sold milk Kshs.150 in the first year. However, the suggested selling price of Kshs. 200 for 500mls pasteurised milk and 250 mls yoghurt will attract profit during the entire period of the business. To mitigate the fluctuation of the BEP the fixed cost return should be spread over four years and units of raw milk sold increase by 5% annually. This will move BEP for raw milk

 $\label{eq:product} \mbox{P a g e } \textbf{46} \\ \mbox{0 - conclusions and recommendations} \\$

from Kshs. 129 to Kshs. 116 representing a 9% decrease in BEP by the 7th year of operation. This is an ideal price trend for a start-up consumer company that will ensure sustainability in the long run.

In conclusion, the consultant recommends that a seed capital investment of approximately Kshs. 56 Million should be in form of a social enterprise grant. This means that women traders will not be required to divert profits to pay off the investment. The IDEAS-LED grant offer is therefore the best capital investment as it requires no return on investment but it allows scaling up of the enterprises to realise better incomes for the women. The proposed asset investment at primary and secondary trader levels will fosters closer partnership between the community, private entrepreneurs and the county government. In addition, the suggested asset investment model will allow transparent use of public resources that will in turn support and spur the local economic development of Wajir County.

Annex 1 LIST OF EQUIPMENTS

	Prima	iry Traders				Qua <mark>ntity of c</mark> (Litres)			
Location	Motor	Kiosk	Chest freezer	No.	5	10	20	25	
	cycle			women	<u>/</u>				
Griftu	3	3	6	30	60	60	60	60	
Diff	3	3	6	30	60	60	60	60	
Burder	2	2	4	20	40	40	40	40	
Leheley	3	3	6	30	60	60	60	60	
Bute	2	2	4	20	40	40	40	40	
Khorof harar	2	2	4	20	40	40	40	40	
Total	15	15	30	150	300	300	300	300	
Price	3,000,000	7,500,000	10,800,000	Price	626,400	709,800	1,722,600	1,809,600	4,868,400

*For each kiosk you have 10 women each given 2 aluminium can of all sizes (5, 10, 20 and 25Litres) 25L can will be used for transport of milk.

Wagalla milk traders existing kiosk will be equipped with a 200L capacity batch pasteuriser and water chiller and a manual packaging and sealant machine all costed at Kshs. 770,000.

Secondary trader			Quantity of cans (litres)						
			Refrigerated Milk	No.					SK I
Location	Tuktuk maziwa	Klosk	AIM	of women	50L can	20L	10L	5L	
Griftu stage	1	3	3	30	3	60	60	60	
Orahey stage	1	3	3	30	3	60	60	60	
Soko mjinga	1	2	2	20	2	40	40	40	
Total	3	8	8	80	8	160	160	160	6923
Price	741,000	4,000,000	2,000,000	Price	67,280	918,720	378,560	334080	1,698,640

Annex 2 : LIST OF PREFERRED INPUT SUPPLIERS

1. Non-spill aluminium milk cans

Adfab General Company Limited-Wajir based Company							
Aluminium Can (litres)	Price (Kshs)						
5	2,000						
10	3,000						
15	4,000						
20	5,000						
Contact: Mahbub- $+254790601624$							

Ashut Can (litres) Price (Kshs) 5 2,088 10 2,366 15 4,176 5,742 20 25 6,032 30 6,890 40 7,656 50 8,410 10 Mazicans 1,000

Ashut engineering division:

Physical location:- Nyahera road off Lunga road Mobile: 0715 416844 / 0737 556780 Website: http://www.ashut.com/product-category/agriculuture/milk-cans/milk-cans-milk-

cans/

2. Solar powered chest freezers

Solar World Group

Tel: 0722-798000, 0731-798000

Email: sales@solarworld.co.ke

Website: http://www.solarworld.co.ke/index.html

P a g e 49 Annex 2: list of preferred input suppliers

3. Solar harvesting kiosk

Green hub- Sustainable Construction Company. Est. 2015 in Langata, Nairobi. Mobile: 0714 922 556, 0710 885 653. greenhub.ke@gmail.com or contact@greenhub.co.ke Website: www.greenhub.co.ke

4. Innovative plastic recycling company

MEGAGAS Enterprises Mobile: +254-721824312 <u>mulema@megagas.co.ke</u> Website: <u>www.megagas.co.ke</u>

5. Automatic milk dispensers, Bulk pasteurizer, water chiller and manual cup packaging and sealant machines

Maxtek technology solutions P.O. BOX 51182-00100, Nairobi-Kenya. Dares salaam Road, ABC Bank Building, Industrial Area. Tel/Fax: +254-020 555025, Phone: +254 715082921, +254 723262532 Email: <u>maxteksales@hotmail.com</u> Excellence in Milk Processing and Handling Equipments and kitchen machinery

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