# Feasibility Study and Business Plan for the Expansion of Meatu Milk Company Ltd

Final Report

Kurwijila, L.R.
Gration.Bamwenda and
Mutahyoba Baisi

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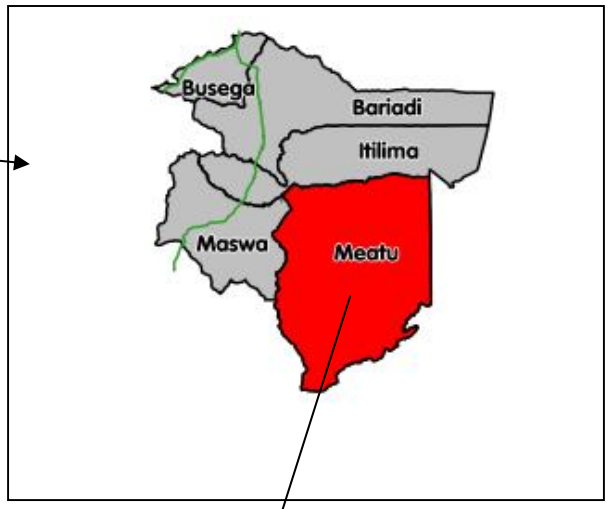
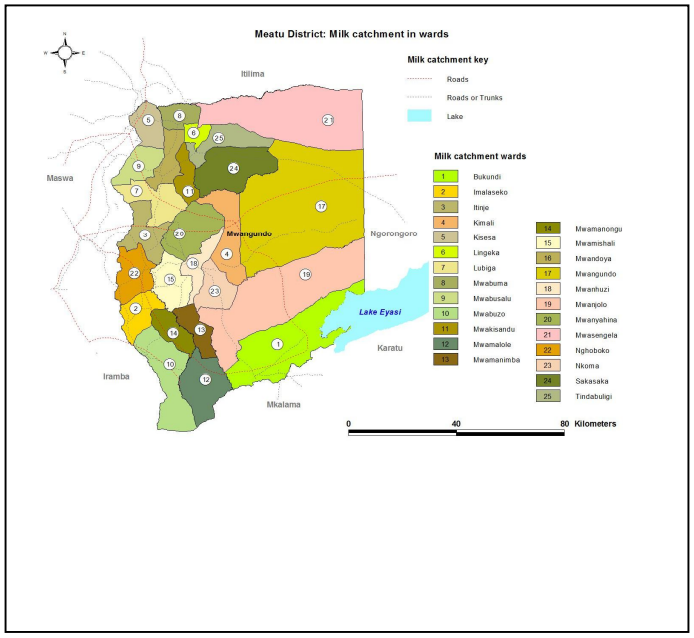
# Acronyms, Abbreviations

| | |
|---|---|
| BO | Butteroil |
| $BOD_5$ | Five day biological oxygen demand |
| BRELA | Business Licensing Agency |
| CBPP | Contageous Bovinepleuropneumonia |
| CET | Common External Tarrif |
| COD | Chemical oxygen demand |
| CPM | Cleaner Production Methods |
| EAC | East African Community |
| EADD I | East African Dairy Development programme Phase 1 |
| FMD | Foot and Mouth Disease |
| FSDT | Financial Services Deepening Trust |
| IBT | Ice Bank Tank |
| ILRI | International Livestock Research Institute |
| IMS | Information management System |
| IRR | Internal rate of Return |
| LGA | Local Government Authorities |
| LPD | Liters per day |
| MALF | Ministry of Agriculture , Livestock and Fisheries |
| MCC | Milk Collection Centre |
| MCP | Milk collection point |
| MDC | Meatu District Council |
| MMCL | Meatu Milk Company Ltd |
| MOAC | Ministry of Agriculture and Cooperatives |
| MYE | Meatu Youth Enterprise |
| NBS | National Bureau of Statistics |
| NEMC | National Environmental management Council |
| NPV | Net Present Value |
| NSSF | National Social Security Fund |
| OSHA | Occupational Health Authority |
| RVF | Rift Valley Fever |
| SADC | Southern African Development Community |
| SIDO | Small Industries Development Organisation |
| SUA | Sokoine University of Agriculture |
| SWOC | Strength, Weakness Opportunities and Challenges |

| | |
|---|---|
| TADAT | Tanga Dairy Trust |
| TAMISEMI | Tawala za Mikoa na Serikali za Mitaa |
| TAMPA | Tanzania Milk processors Association |
| TBS | Tanzania Bureau of Standards |
| TCCI | Tanzani Chamber of Commerce, Agriculture and Industry |
| TDCU | Tanga Dairy Cooperative Union |
| TDDP | Tanga Dairy Development Programme |
| TFDA | Tanzania Food and Drug Authority |
| TFL | Tanga Fresh Ltd |
| TIRDO | Tanzania Industrial Research and Development Organisation |
| UHT | Ultra High Temperature |
| UNDP | United Nations Development Organisation |
| VAT | Value added tax |

# 1 Map of Meatu District



# Project Summary

1. Meatu Distict is one of the five districts forming Simiyu region in the South Eastern part of the Lake Victoria basin in Tanzania. Simiyu region has approximately 1.5 million head of cattle, of which about 400,000 are found in Meatu District. The region enjoys a monomodal rainfall pattern of 600-900 mm starting in October and ends in May with two peaks (October –December and February –Mid May); It is estimated that during the wet and dry seasons, approximately 60,000 and 40,000 litres of milk per day could be available for processing in Meatu District.
2. Nearly all the milk is marketed informally in the form of raw milk. At the same time Simiyu region as a whole depends on processed milk products brought in from other parts of the country or those imported from countries in the East Africa region, South Africa, Europe, Middle East and New Zealand. This supply gap presents an opportunity for Meatu to exploit the potential emanating from the presence of considerable volumes of milk, which could be collected, processed and distributed within and outside the district and beyond.
3. The Meatu District Council (MDC) working in partnership with the Meatu Youth Enterprise (MYE) has established a joint venture company; the "Meatu Milk Company Ltd. (MMCL). The MMCL is registered by BRELA with registrion no. 133446. In October 2016, MCCL established a small scale milk processing unit with a capacity to process 800 litres of milk per day.
4. The Meatu Dairy Company Limited (MMCL) commissioned this study to research the proof of concept of a move to expand offerings including supplying powder milk by processing 250,000 liters of milk daily, which is equivalent to an output of 32.5 tons of powdered milk per day[1,2], to increase revenues and net income.
5. The aim of this study was to determine whether the concept is operationally, marketwise, and commercially viable, and to determine and define any issues that would argue against the concept, including understanding the risks better and preparing for them. The second objective was to develop a business plan so

[1]Project Proposal on the Expansion and Modernization of Milk Processing Plant (EMMPP), MMCL, April 2017.
[2] One liter of milk yields 130 g of powdered milk; processing is normally around 25,000L per hour.

as to know how big the opportunity is; how to make it happen; the market that can be reached; to determine needed management, administrative, organizational, and regulatory measures; ascertain competitiveness levels, and determine how much support and resources are needed.

6. The study was undertaken through literature review, contextual analysis of the Tanzania dairy industry development trends, and holding consultations with owners; Simiyu Regional Secretariat, Meatu Local Government Authorities, Business Community, a multitude of stakeholders, and undertaking field surveys.

7. This document presents outputs from the feasibility study, which was developed through undertaking research, and individual and group stakeholder consultations with MMCL owners, management, and key stakeholders.

8. The technical feasibility study indicated that based on the cattle statistics (353,000 head) for Meatu District alone, milk offtake (excluding milk taken by the calf) is about 11,366,928 litres/annum of which about 3,433,470 litres (about 30%) from the predominantly traditional cattle herd (there was only about 125 improved dairy cattle reported), is currently available for marketing off-farm. About 70% of milk produced is for subsistence consumption within the producer households and selling to neighbours. From this data we estimated that daily volumes of milk available for marketing in Meatu district alone is about 9,407 litres per day.
9. Reports from within East Africa countries have indicated that to be viable, milk collection centres must collect and handle an average of 700 litres per day. Spacial mapping of milk offtake concentration in Meatu district show that Bukundi, Imalaseko, Mwanjolo, Mwangundo, Itinje and Mwamalole are the wards/locations with the highest potential for milk collection.

10. Based on experiences from other milk shed areas in Tanzania and the fact that due to various challenges, nationally only about 3% of milk produced or 10% of marketed milk is currently processed; and that more than 80 factories of various sizes currently operate at about 26% of the total installed capacity (640,000 litres/day), we make a liberal assumption that concerted efforts and proper investment in Meatu District may enable 30-50% of the marketable milk to be channeled through the proposed MMCL dairy factory. This means that 3000-5000 litres depending on season could be collected per day from Meatu Distrrict alone. If the milk catchment area is extended to other areas of Simiyu with a high concentration of cattle, it would be possible to double the collection to 6,000 to

10,000 litres per day thereby enabling the plant to be operated at 40-60% of installed capacity.

11. Additionally, an injection of 200-400 crossbred heifers or the Mpwapwa breed per year for a period of five years on loan basis to farmers, could be considered a good strategy to ensure sustainable growth of the dairy industry in Meatu and Simiyu region in general.

12. While small milk driers of 30,000 litres per day are available, such small plants are not economically viable/competitive when compared to commercial milk drying plants processing 100,000 to 4 million litres/day. This is especially so when availability of very high quality milk cannot be guaranteed at all times. It is therefore proposed to start with a mixed product milk processing plant. Using the data collected, a technical feasibility study analysed the potential for collectable milk for processing in Meatu District, and additional investments in dairy cattle husbandry that would be needed to address the inadequacy of the traditional cattle herd to support a profitable operation of medium sized milk processing plant with a capacity of 15,000 litres per day. Based on consumer demand analysis, a product mix comprising fresh pasteurized milk, cultured fermented milk, yoghurt, Butter and ghee and cooking cheese (Mozzarella) was adopted. The economic feasibility study is based on these technical premises.

13. The economic feasibility uses the following key assumptions:
    a. The sponsors of the project are committed to undertaking the investment and are ready to inject in the requisite capital.
    b. At least 5 milk collection centres with capacity of 3,000 litres each will be strategically located in a few out of the 25-30 wards/villages with the highest concentration of cattle/collectable milk.
    c. Given the envisaged price to be set and the quality of the product, and the support from the Government, MMCL will eventually conquer at least 50% of the milk products market in the Lake zone and 15% of the Tanzania market.
    d. The starting capacity utilization will be about 30 % of the installed capacity in year 1 rising to 60% by the 5$^{th}$ year onwards. This level will be maintained and increase annually at a rate of 5%.
    e. The cost of production will be about 75% of sales
    f. Income from other sources (sale of by products) will be 5% of net sales starting in 2020.
14. The economic feasibility study show that the initial investment for the proposed MMCL is estimated at TZS 4,400,000,000. This will be partially financed by a 6

year 15% loan from the NSSF (inclusive of a one year grace period) and equity to be provided by the project sponsors.

15. The financial viability of the proposed MMCL Project was assessed through profitability, valuation metrics (i.e. the internal rate of return, the net present value, the payback period, and profitability index), cash flow position and overall financial position as represented by the balance sheet.
16. Overall, under the normal assumed conditions, the project exhibits a positive and increasing profit after depreciation but before interest and taxes over the 15 years of analysis. Assuming normal conditions relative to prices of products and inputs and a cost of production of 70% the project will generate an IRR of 23.81% (against the 15% cost of capital), a positive NPV of TZS 1,588,843,252, a benefit-cost ratio of 1.35 and a payback period of 7 years. All these metrics indicate that the project is financially viable and it will generate profits enough to pay off the NSSF debt within the requisite period of 6 years (inclusive of one year grace period) and generate retained earnings and dividends for the shareholders.
17. The financial metrics assuming the most pessimistic scenario of prices falling by 10% from the predicted level, cost of production of 80% of expected sales and expenses rising by 15%. With this scenario the project still remains profitable in terms of sales revenue and profitability of the project for the first five years. With this scenario, the IRR will be 18.74% (against the cost of capital of 15%). The NPV will be TZS 746,146,093, the benefit-cost ratio will be 2.86 and the payback period will be 9 years.
18. The above investment scenario can, however, change if the project injects in a further TZS 2 billion to purchase 200 heifers to ensure a reliable supply of milk. In this case the requisite initial investment will be TZS 6,700,000,000. Crossbred heifers can be introduced at rate of 200, 300 or 400 per year over 5 years.. The financing arrangements will change with the Meatu District Council required to raise about 77.6% of the requisite capital and the loan from NSSF comprising the balance 22.4% .In this case the project will not be viable as the NPV of the project will be negative, the IRR well below the cost of capital of 15% and the benefit-cost ratio below 1. Such additional capital investment may take the form of social capital grants from a regional dairy development project.
19. A margin of safety analysis to show the amount by which sales can drop before a loss will be incurred was performed. With the targeted initial capacity utilization of 50% the facility can afford to incur a cost of production of 80%, decrease the capacity utilization to 30% and prices decreasing by 30% before it incurs any catastrophic consequences. This indicates a commercial viability of the project because under normal circumstances it is not envisaged that sales will reach a point whereby it will have to fall by up to 60%.
20. The commercial viability of the project is hinged on the assumption that there is a market for the product such that at the beginning the plant will utilize its capacity

at no less than 30%. Given the market analysis, this level will be easily surpassed. Also it is assumed that the cost of production will not exceed 75% of sales. This implies that the lowest gross profit margin to be acquired is 25%. Below that level the project will not be viable although the NPV will still be positive and the IRR above the cost of capital. As an entry strategy, it is recommended that without compromising on the quality the gate prices for all the products be below those of major competitors. Market for fresh and fermented milk will be further assured through a school milk feeding programme supported by the LGA.

21. This feasibility study document presents various options/scenarios for evidence based investment decision making by the owners of MMCL. In view of the huge amount of investment capital required (Tshs 4.4 Billion) it is recommended that apart from securing a loan of 1.5 billion shilling from NSSF, the MMCl should also seek addition social capital funds in the form of low interest loans or grants to finance the development of dairy farming as a business in Meatu District and facilitate formation of farmers groups and their capacity building. More details of recommendations and follow-up actions are given in section 4.

# 1. Introduction

## 1.1 Overview of Meatu District

Meatu district is among the five districts in Simiyu region, it covers 883,500 hectares and has 35,238 households with population estimated at 299,619 (NBS, 2012). Agriculture and livestock keeping are the major economic activities in the district. In virtue of the good vegetation cover on its terrain surface, the district has abundant number of cattle estimated at 353,000 as referenced by the National census survey of 2012. Milk production is averaging 40,000 liters per day and mounts up to 60,000 liters/day during high rainfall seasons. Indigenous breeds are domesticated by pastoralists for milk and meat production with daily milk production ranging between 1 to 2 liters per cow. Most of the milk produced in the district is absorbed within the local market, mostly at Mwanhuzi, Mwandoya, Maswa, Kishapu, Bariadi and Itilima. Though there are potentials in this industry, still more efforts are needed in favour of the producers to boost the industry. Strategically, the expansion project should aim at improving milk production, processing and marketing by integrating milk products from both local and improved dairy breeds.

In Meatu, Local cattle are grazed by rural communities in large stocks. Milk and meat productivity are less than 2 liters per day and 100 kg per cow, respectively. The industry is facing a number of challenges including: most of the livestock keepers owning big herds not for business but prestige; overgrazing and shifting pastoralism are common practices which have caused land degradation, depletion of natural vegetation and water sources. Livestock keepers do not have a direct link to the markets and the income they earn from dairy keeping is not known. Farmers are therefore not motivated to invest in improved grazing technologies. Milk producers do waste a lot of money through milk spoilage and spillage particularly in the flush season as the absorption capacity of the milk market is too small to accommodate the larger quantity supplied. Other factors include poor cattle feeding technologies, reliance on rain fed and natural pastures, improper milking and handling facilities.

## 1.2 The current status of MMCL and the need for expansion

In trying to respond to the existing constraints, Meatu District Council (MDC) aggregated 84 youths from eight (8) different business groups and syndicated them to form a group of milk processors titled Meatu Youth Enterprise (MYE) who then formed a collaborative business company with MDC known as Meatu Milk Company Limited (MMCL). The company is supporting the government PPP Act of 2010 which provides for the government institutions to make collaborative investments with private companies. The company is fully registered by Business Registrations and Licensing Agency (BRELA) in Dar Es Salaam with the company registration number 133446. The shareholders with their share in bracket are MDC (95%) and MMCL (5%). In 2016, the MMCL resolved to

establish a modest milk-processing factory with a capacity of 800 litres per day in Mwanhuzi town, Meatu district. During October 2016 to June 2017, MMCL processed a total of 22,223.5 liters of milk; an average of 81.4 liters of milk per day which is about 10% of installed capacity..

Meatu Milk Company Limited plans to expand production so as to increase efficiency and volumes to cater for growing demand for dairy products. The expansion will involve mainly the infrastructure to increase operational capacity and capabilities; and changes in operating practices, productive resources, and marketing function. The target is to provide employment to at least 500 youths and directly benefiting more than 400 milk producers by 2020.

Strategically, the project aims at increasing processing capacity through:

i. Developing contract farming scheme to ensure consistent supply of quality raw milk to MMCL.
ii. Increase milk yield from an average of 2L to at least 4L per cow per day for local breeds and 30L per cow per day for exotic breeds.
iii. Develop milk collection / delivery systems / facilities that facilitates timely products delivery
iv. Increase number of engaged milk producers to at least 400 from 30 villages of Mwabuzo, Imalaseko, Mwabalebi, Mwamanongu, Mwanzugi, Igushiru, Nata, Bukundi, Kabondo, Ng'hoboko, Mwamalole, Mwanjolo, Mwamanimba, Bulyanaga, Lata, Buhangija, Mbushi, Jinamo, Mwabagimu, Mwangudo, Makao, Nkoma, Paji, Mwabagosha, Sapa, Irambandogo, Lukale, Usiulize, Dakama na Mwamanoni.
v. Construction of new processing warehouse to accommodate large processing machinery with capacity of 2000L per hour and cold rooms for storage of raw and processed milk.
vi. Expand types of products to be produced by MMCL from a current single product (yoghurt)
vii. MMCL to procure Friesian cows to ensure increase supply of milk to the plant from own source.
viii. Increase the number of youths with different qualifications to be hired on milk processing, handling and milk quality control procedures. Procurement of a Modern packaging machinery for packaging of processed milk products at different volumes.

## 1.3 Objectives of the study

The Economic and Social Research Foundation (ESRF) through the UNDP project **Pro-Poor Economic Growth and Environmentally Sustainable Development (PEI) Project** has undertaken this feasibility study and development of a business plan in order to investigate whether expanding and modernizing Meatu Milk Company Limited

would be feasible proposition from an economic and operational standpoint, and if so, to enable Meatu Milk Company Limited to mobilize the requisite productive resources, including convincing potential funders to provide low cost financing for this purpose.

The main purpose of the feasibility study has been to get information and data that would facilitate to assess the potential for the success of the expanded factory and to enable the Meatu milk management, Meatu Local Government Authority, Regional Leadership and the prospective funders to make evidence based and informed decisions on the concept of expanding the MMCL dairy processing business enterprise.

The objectives were:

- To research the proof of concept of expanding and modernizing the Meatu Milk; that is to determine whether the concept is operationally, marketwise, and commercially viable, and to determine and define any issues that would argue against the concept, including understanding the risks better and preparing for them;
- To develop a business plan so as to know how big the opportunity is; how to make it happen; the market that can be reached; to determine needed management, administrative, organizational, and regulatory measures; ascertain competitiveness levels, and determine how much support and resources are needed.

## 1.4 Scope of work and deliverables

The scope of work and deliverables are presented in Annex I.

# 2 Methodology and approach

## 2.1 Technical and economic feasibility study.

### 2.1.1 Technical Feasibility Study

The technical feasibility study was done by conducting field survey to collect information regarding:

- Traditional and improved dairy cattle population; milk production, milk off-take and marketable surplus milk analysis,

- local milk trade practices including, volume of milk traded per season, prices received from consumers, costs incurred in transporting milk to consumers, challenges faced, aspirations; willingness to supply milk to milk processing plant
- Milk collected and processed by MMCL since its establishment.

The above collected data was used to estimate potential milk availability and catchment areas; possible location of milk collection centres; projections of improvement in milk production and marketing in the Meatu District and surrounding milk shed areas based on extrapolations from the livestock census data, and the assumption that 20% of indigenous cattle are lactating cows which produce an average of 160 litres of milk per lactation year above the calf requirement. Also, approximately 40% of the improved dairy cattle is assumed to be mature cows of which 68.8% are lactating and produce an average of 1700 litres per lactation-year. Further assumptions are that 30% of milk from the traditional cattle and 70% from the improved cattle is marketed off-farm (SUA/MoAC/ILRI, 1998). The remainder is consumed at home or sold to nearby doorstep buyers.

A review of the performance of dairy industry operations in other areas with similar environment in Tanzania and elsewhere was done in order to benchmark likely levels of performance with respect to milk intake volumes, seasonality, product mix , market function and levels of informal trading of raw milk *vis á vis* formal milk processing and marketing of packaged milk.

Due to the likely shortfall of milk supply if milk were to be based solely on collecting milk from the traditional cattle herd, a programme for developing the Meatu dairy industry using cattle with higher milk producing ability such as the Mpwampwa breed, the Sahiwal and the Boran as well as crossbred dairy cattle was considered to be part of the MMCL expansion programme targeting to benefit at least 1000 farmers in five years. Such number of improved cattle combined with the traditional cattle herd would reliably supply sufficient milk to the processing plant by 2020.

Sizing of the dairy operations in terms of expected total milk inflows and products mix based on current and future market demand were then done using modestly optimistic current and projected milk production and off-take figures. Location and size of milk collection centres were based on current and projected milk offtake concentration as determined by cattle population density and future productivity levels of improved cattle and husbandry practices.

Required technologies for the various dairy operations were identified and cost estimates for their acquisition were obtained from reliable potential suppliers and incorporated in the investment and implementation schedules.

Based on plant sizing and product mix scenarios, human resource and skills requirement were identified and costed. Quantities of products expected to be produced under different mix scenarios and their ex-factory prices were calculated and their values estimated basing on current and projected future prices.

Finally, regulatory requirement prior to and during implementation of the project were assessed through literature review and confirmed through consultations with various dairy industry stakeholders and regulatory institutions relevant for the dairy industry operations.

#### 2.1.2 Economic feasibility analysis

Based on the technical feasibility and marketing analysis economic feasibility was undertaken followed by development of a business plan. The financial viability of the proposed MMCL Project was assessed through profitability, valuation metrics (i.e. the internal rate of return, the net present value, the payback period, and profitability index), cash flow position and overall financial position as represented by the balance sheet.

# 3 Findings and analysis

## 3.1 Supply and Demand

### 3.1.1 National Milk production and offtake trends

Table.1 presents the national milk production trends. As seen, the bulk of the milk originates from indigenous cattle that form over 90% of the cattle population. Most of the milk is consumed at household level and local market; only about 3% of the milk filters through to the formal market and for processing purposes. Most of the raw milk is sold directly by farmers and small scale traders to the final consumer without it passing through processing facility. This reality has to be taken into account when making projections on the likely volumes of milk that would be available from Meatu and its environs.

As shown in Table.1, milk production in Tanzania has been increasing steadily with time. According to the MALF and other studies[3], the observed increase by both indigenous and improved dairy cattle is mainly due to increase in herd size rather than productivity of cattle. The consultations with herdsmen in Bukundi revealed that Milk productivity in Meatu is strongly influenced by seasonal factors. For example, the zebu cattle. produce 0.5-1 liters a day during the dry season compared with 1 to 2 liters a day during the wet season, mainly due to the availability of pasture and water. Data from various milk collection centres in Tanzania show that seasonal fluctuation of milk is much wider in collection centres that depend on traditional cattle than those that depend on improved crossbred dairy cattle (Fig 1). These factors if not resolved in time may make it harder for producers to have continuous sales during the short supply season, and it means MMCL may face a shortage of milk during the dry season. This calls for expanded MMCL to have its own diary cattle farm to ensure consistent supply of more than 15,000-30,000 L throughout the year. Alternatively, the stakeholders have proposed that the expanded MMCL may design and implement milk supply program, in which prospective milk supplier families, e.g. teachers in schools and selected champion farmers, are given four to ten improved dairy cows and enter into contract with MMCL to supply milk for a given period.

According to interviewed herdsmen, the productivity and total output are well below the expected production potential due to various challenges, especially lack of adequate feedstock/pastureland, water, unfavorable weather conditions, low genetic potential of indigenous cattle leading to lower milk yields and output, inadequate farmer to market linkage, etc. similar challenges were observed by the authors during field surveys in Meatu District.

[3] URT (United Republic of Tanzania) (2011): Livestock Sector Development Programme (LSDP), Ministry of Agriculture, Livestock and Fisheries (MALF), Dar-es-Salaam; TAMPA (2016) Effects of Milk Imports on Domestically Processed Milk Competitiveness in Tanzania

**Table 1 National milk production**

| Years | Indigenous Cattle | Improved Dairy Cattle | Total National Milk Production |
|---|---|---|---|
| **2001** | 514,000 | 300,000 | 814,000 |
| **2002** | 578,000 | 322,500 | 900,500 |
| **2003** | 620,700 | 359,800 | 980,500 |
| **2004** | 813,700 | 366,300 | 1,180,000 |
| **2005** | 920,000 | 466,400 | 1,386,400 |
| **2006** | 941,815 | 470,971 | 1,412,786 |
| **2007** | 945,524 | 475,681 | 1,421,205 |
| **2008** | 980,000 | 520,000 | 1,500,000 |
| **2009** | 1,012,436 | 591,690 | 1,604,126 |
| **2010** | 997,261 | 652,596 | 1,649,857 |
| **2011** | 1,135,422 | 608,800 | 1,744,222 |
| **2012** | 1,255,938 | 597,161 | 1,853,099 |
| **2013** | 1,297,775 | 623,865 | 1,921,640 |
| **2014** | 1,339,613 | 650,570 | 1,990,183 |
| **2015** | 1,381,451 | 677,275 | 2,058,726 |
| **2016** | 1,423,288 | 703,979 | 2,127,267 |

Source: MALF, 2017

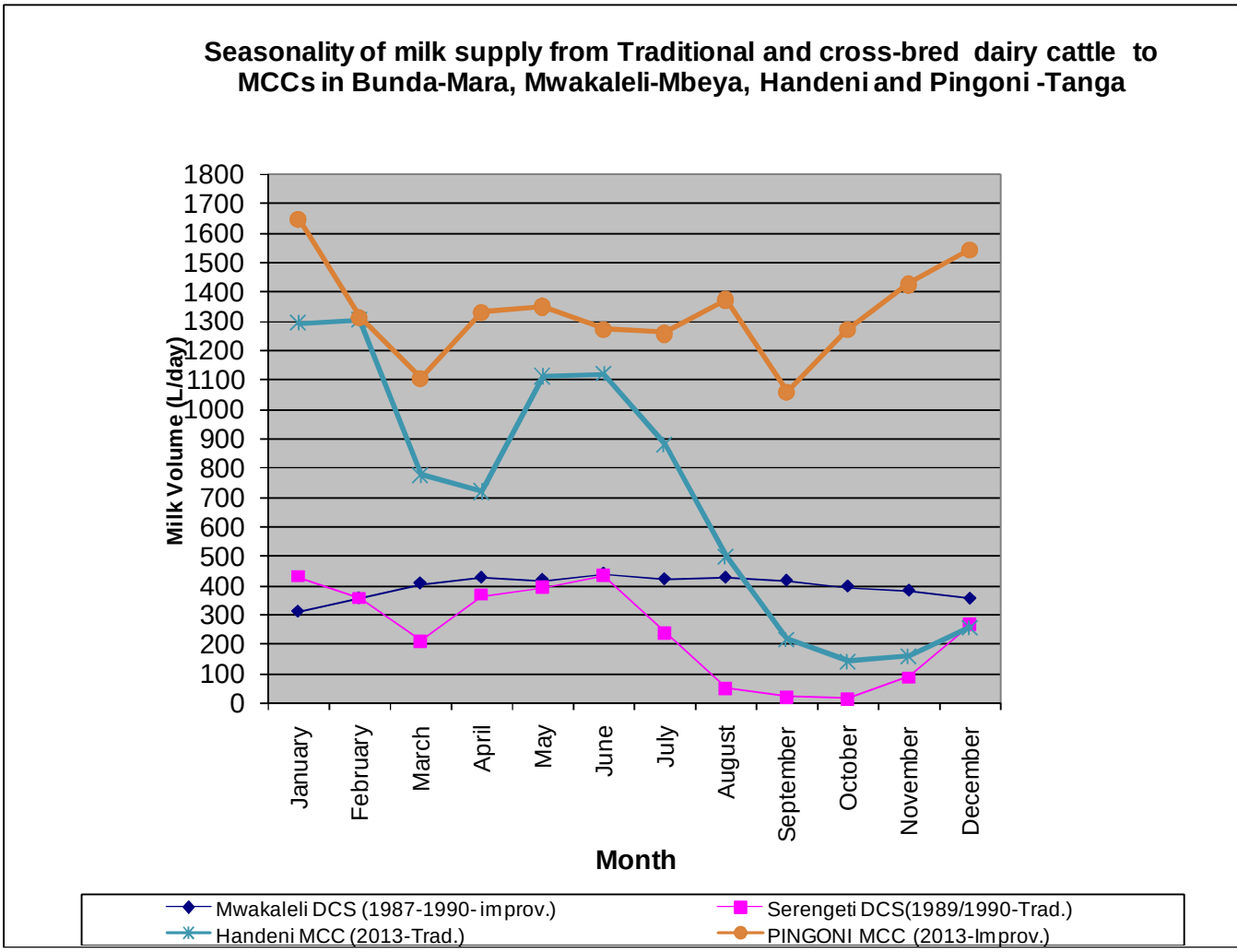



Fig 1: Seasonality of milk supply to MCCs from traditional and improved dairy cattle herds

In most dairy products processing systems, the raw milk is collected from producers by one or more bulk buyers, who then sell the bulked milk to the processors. In more organized systems, milk chiiling centres owned and operated by groups of milk producers receive milk from producers, perform quality checks and cool the milk in refrigeration bulk tanks. Bulking is necessary to cover the high cost of transporting milk, but there is a major risk that when milk from different farmers is collected and mixed together, milk of poor hygienic quality may lead to the possible spoilage of milk due to introduction of bacteria.

### 3.1.2 National milk demand and consumption trends

According to the TAMPA study[4] on which type of customers mostly buy processed milk products in Tanzania, it was found that greatest demand comes from middle-income customers, followed by low-income individuals, with high-income customers, those with families, students and children coming close behind.

**Table 2: Milk Products Demand by Consumer Groups in Tanzania, in 2012**

| Consumer group | % |
|---|---|
| Middle-income individuals | 16.9 |
| Families | 15.7 |
| Low-income individuals | 14.5 |
| High-income individuals | 13.3 |
| Students | 12.0 |
| Children | 12.0 |
| Schools | 4.8 |
| Companies | 4.8 |
| NGOs | 2.4 |
| Cooperatives | 1.2 |
| Government | 2.4 |

Source: TAMPA, 2013

Regarding the milk products preferred by customers, Table 3 indicates that customers in Tanzania mainly prefer fresh milk followed by powdered milk and cheese. Other products in great demand are ice cream and yoghurt. At local level, these preferences may vary greatly. For example, the interviewed shop keepers, restaurant owners, and customers in Meatu reported that fermented milk and yoghurt were more preferred than fresh (raw) milk.

Discussion with the consumers of MMCL cultured milk and yoghurt in Maswa and Bariadi Districts, indicated that they preferred MMCL because they have a great taste and are made from milk from indigenous cattle. The only problem they mentioned was

[4] TAMPA (2016), A Baseline Study on the Implementation of the VAT Rate of Zero in the Diary Sector n Tanzania.

that in most shops one can get large volume products (500 ml) and the price of TZS 2,000 per bottle is a bit expensive, compared to, e.g. homemade cultured milk of TZS 200-500 per glass at *Mama Lishes*. The interviewees proposed that MMCL should invest in selling their products in small packaging, e.g. 150-180 ml. Informal interviews with consumers of milk products in Mwanza and Dar es Salaam indicated that some Tanzanians feel that imported products are of a better quality (e.g. from Kenya, South Africa, Zimbabwe) but expensive compared to Tanzanian products. However, interviewees observed that companies, such as Azam Dairy Products , Tanga Fresh, ASAS, Dar Fresh, and small companies such as Shambani Milk, Meatu Milk and others with daily processing capacities below 200 L are improving in terms of quality and will be able to compete with imported products in the near future. For this reason, the proposed expansion of MMCL could contribute to filling the demand supply gap currently attracting a lot of imports and employment creation and contribute to industrialization of the local economy.

**Table 3: Milk or Milk Produced in Tanzania**

| Milk or Milk Product | % |
|---|---|
| Fresh milk | 17.7 |
| Cheese | 13.9 |
| Powdered milk | 13.9 |
| Ice cream | 12.7 |
| Yoghurt | 12.0 |
| Flavored milk | 11.4 |
| UHT milk | 8.9 |
| Butter | 5.1 |
| Ghee | 3.8 |

Source: TAMPA, 2013

Table 4 shows that the price of dairy products, the income level of consumers and the level of awareness of the benefits of consuming milk (especially processed milk) play a significant role in the *consumption* of milk products in Tanzania. The availability and quality of imported milk products also play a significant role. In Kenya, the price of milk products and the income level of consumers have the greatest effect on demand, while the level of awareness of the benefits of consuming milk and milk products play a significant role.

**Table 4: Determinants of the Demand for Milk and Milk Products in Tanzania**

| Factors Affecting Demand for Milk and Milk Products | Very Significant (%) | Significant (%) | Indifferent (%) | Insignificant (%) | Very Insignificant (%) |
|---|---|---|---|---|---|
| Prices charged for your products | 77 | 19 | 3 | 0 | 0 |
| Income level of consumers | 65 | 29 | 3 | 3 | 0 |
| Level of awareness of the benefitsof consuming milk | 58 | 32 | 6 | 3 | 0 |
| Quality of the milk and milk products offered by your company | 39 | 29 | 32 | 0 | 0 |
| Availability of imported milk products | 35 | 45 | 19 | 0 | 0 |
| Consumers' perception of high quality of imported milk products | 32 | 39 | 19 | 3 | 5 |

Source: TAMPA, 2013

### 3.1.3 National milk products import trends

#### ***3.1.3.1*** *Trends in milk and milk imports*

According to the recent study by TAMPA (2016), Tanzania is a net importer of milk, in spite of the tremendous potential of milk production in the country ( Figure 2) In the period 2010 to 2014, milk imports in Tanzania have almost doubled from less than 40 million liters Liquid Milk Equivalent (LME) per annum in 2011 to 70 million liters LME per annum in 2014. In other words, the country has been spending more than USD 20 million per annum since 2010, with a spike seen in 2014 rising to more than USD 40 million. This is a very significant amount spent only in importing milk into the country rather than exporting milk which consequently result to loss of millions of dollars every year (Figure 2)

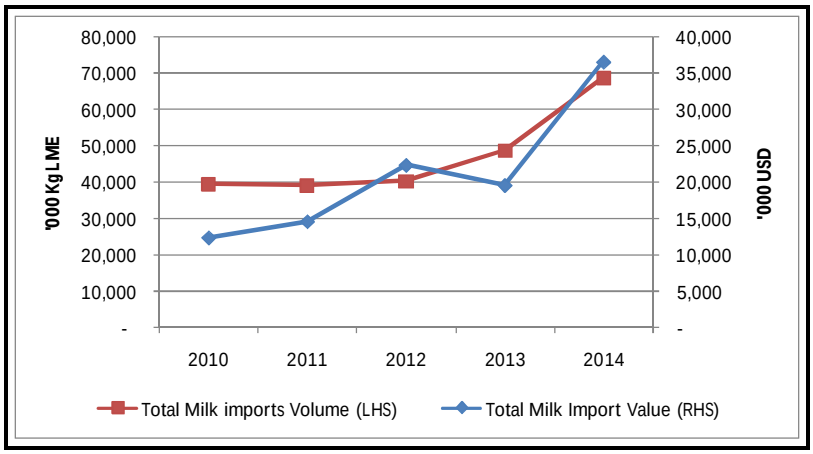



Figure 2: Tanzania Milk Imports Volume and Value Trend

Source: UNCOMTRADE, 2016

The value of exports of milk is very insignificant when compared to imports in Tanzania. As the country spends millions of dollars in importing milk, exports of milk have hardly earned the country half a million of dollars per annum, with the trend showing that milk exports is significantly decreasing, earning the country less than USD 100,000 in 2014 (Figure 3) The analysis also reveals that as the country continues importing significant amount of milk, the ability to export has rapidly decreased since 2011. This calls for measures to address this worrying trend as the government continues to lose revenue from export of domestic milk.

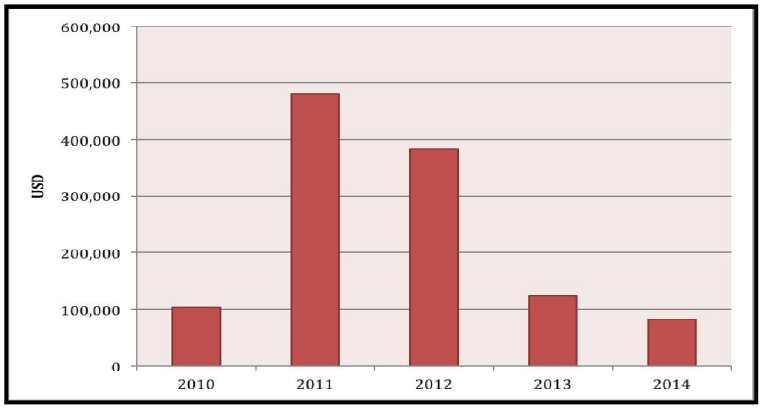



Figure 3: Tanzania Milk Exports

Source: UNCOMTRADE, 2016

As to the import structure, UNCOMTRADE data reveals that powder milk (HS 0402 Milk and cream, concentrated or sweetened) is the highly imported product in Tanzania compared to Liquid Milk (HS 0401 Milk and cream, not concentrated or containing added sugar). As depicted in Figure 5 , the quantity of powder milk imported in the country is twice as much as liquid milk, rising from 28 million liters imported in 2010 to more than 46 million liters imported in 2014. Although the trend has been increasing to both types, but rate of increase in powder milk imports is quite substantial with an average annual increase for the period 2010-2014 being about 15 per cent. This is one of the reason that the MMCL owners and Hon. Anthony Mtaka, the Regional Commissioner for Simiyu Region, came up with the idea to mobilize resources to expand MMCL to produce powder milk.

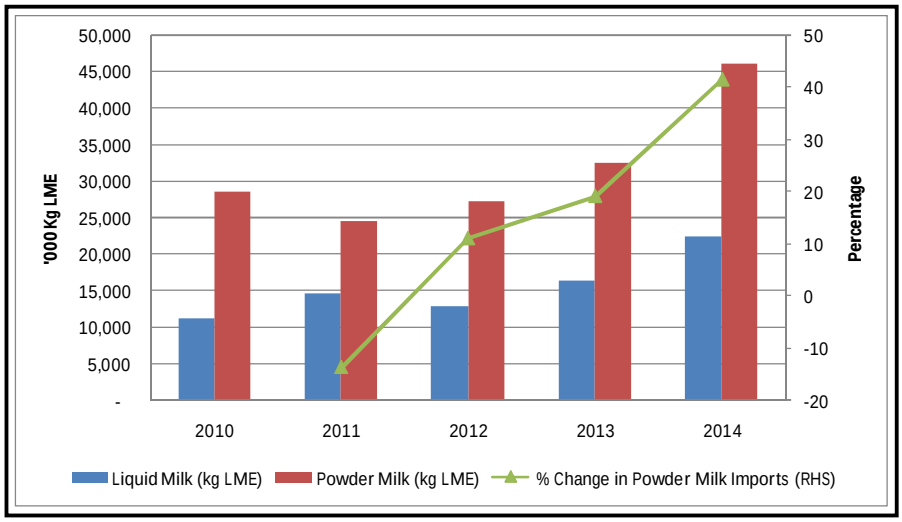



Figure 4: Tanzania Milk Import Structure

Source: UNCOMTRADE, 2016

### 3.1.4 The origin of imported milk and ports of entry

According to the UNCOMTRADE statistics, in the period 2010-2014, Tanzania Mainland imported powder milk from more than 48 different countries at different years. However, overall, more than 45 per cent of the total powder milk imported in the country originated from the Netherlands (28.1 per cent) and the United Arab Emirates (UAE) (16.8 per cent) (see Figure 5). Amongst the ten leading source countries of powder milk is France (8.3 per cent), Oman (7.7 per cent), Ireland (5.8 per cent), South Africa (5.4 per cent), Saudi Arabia (5.3 per cent), India (4.4 per cent), Uganda (3.4 per cent), and Mauritius (2.8 per cent).

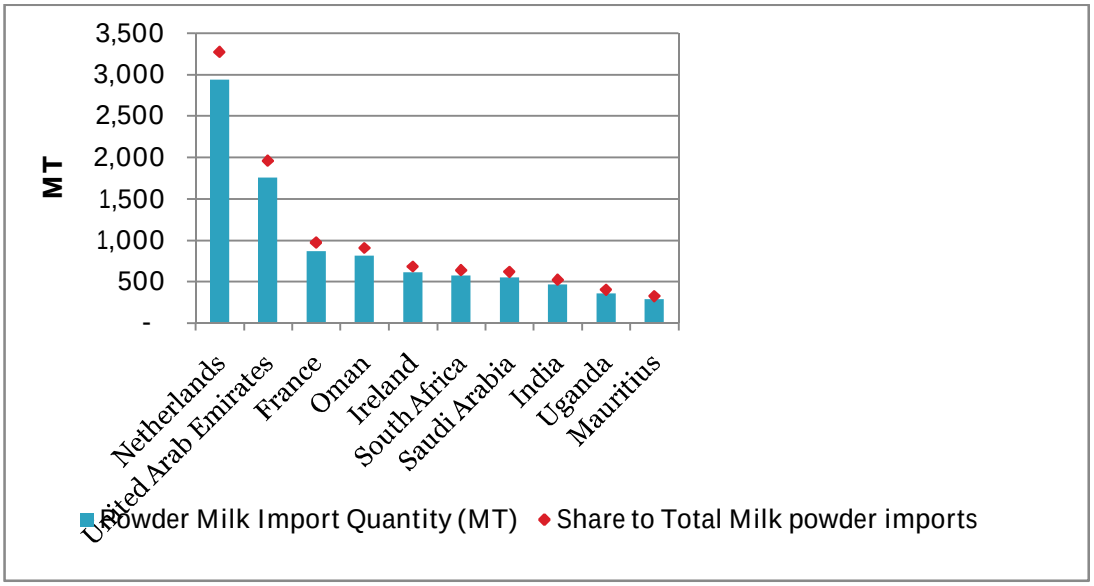



Figure 5: Share and Volume of Powder Milk imports to Tanzania by Origin

Source: UNCOMTRADE, 2016

In the case of Liquid milk (HS 0401), which largely comprises of UHT, more than 98 per cent of all imports originate from Kenya (62 per cent), South Africa (32 per cent) and Uganda (4 per cent) (see Figure 6). This simply implies that the EAC and SADC regional blocs offer competition to fresh liquid milk in the country. Such products are likely to compete with fresh milk sold in the market, particularly in Dar-es-Salaam and other urban centers in the country.

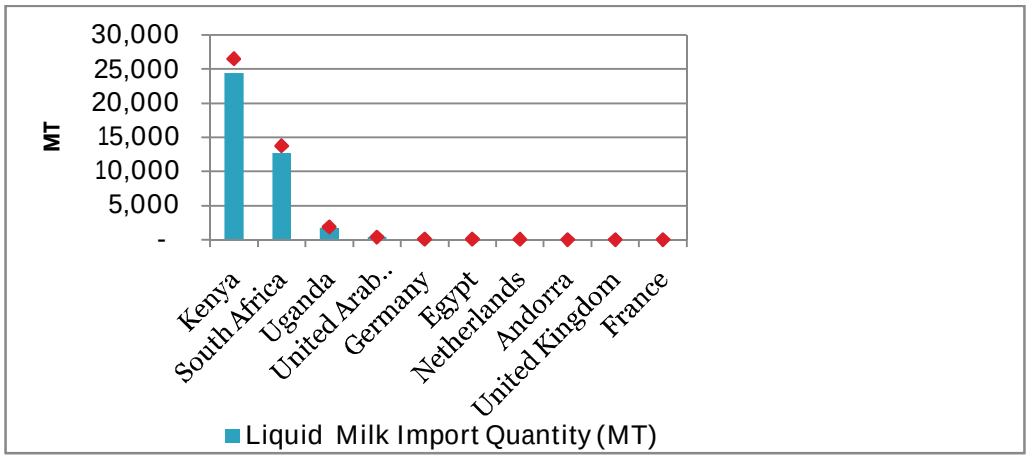



**Figure 6: Share and Volume of Liquid Milk imports to Tanzania by Origin**

**Source:** UNCOMTRADE, 2016

### 3.1.5 Milk processing performance trends in Tanzania

As of 2015, Tanzania is reported to have a total of 72 milk plants processing domestic milk with varying potential and accounting for actual processing capacity of 121,620 liters per day out of 501,500 liters per day of installed capacity. According to statistics from Tanzania Milk Processors' Association (TAMPA), the leading 5 processing companies in terms of liters of milk processed per day, account for 57per cent of the total amount of milk processed per day, with the leading plant processing capturing more than 25 per cent (Figure 7). The other percentage is contribute by smaller processors such as MMCL with installed capacity below 800 L/day.

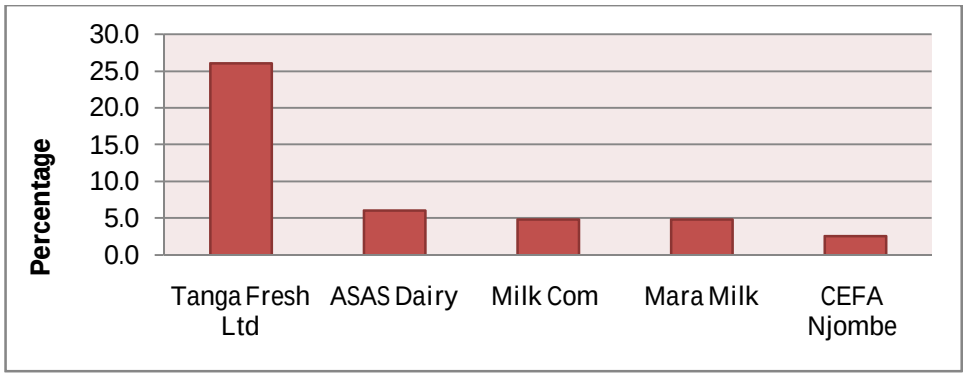



**Figure 7: Top 5 Leading Milk Processing Companies**

Source: TAMPA, 2016

However, as of 2015, Azam Dairies had the highest installed (70,000L) and processing capacity in the country, but reconstituting 100 per cent of imported milk. As indicated earlier, the processing capacities of all the processing factories in Tanzania are still much underutilized, with only 24 per cent of total installed capacity being utilized, leaving 76 per cent idle or unutilized (see **Error! Reference source not found.**). From the 73 processing plants operating in the country, only 2 of them process more than 40,000 liters per day, with the rest being able to process less than 10,000 liters per day.

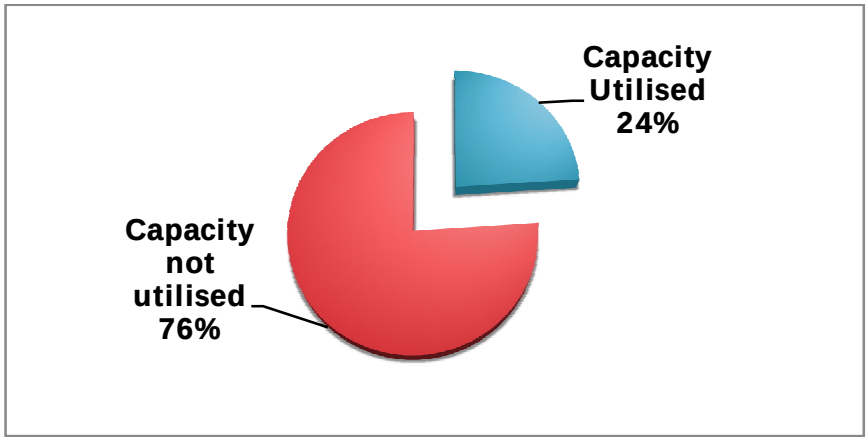



**Figure 8: Processing Plants Capacity Utilization**

Source: TAMPA, 2016

It is estimated that 41 million liters of cow milk is processed annually in the country into pasteurized milk, UHT, cultured, ghee, butter, cheese and cream and sold in the domestic market (MLFD, 2011). However, in the period 2014 and 2015, UHT milk accounted for 27 per cent of market share with 45,000 liters/day being processed per day by a single processor, Azam Dairies, from recombined milkpowder/butteroil. Cultured milk and fresh milk account for 23 per cent and 20 per cent of the market share of dairy products produced in the country, with 38,580 liters per day and 32,570 liters per day processed respectively **Error! Reference source not found.**9).

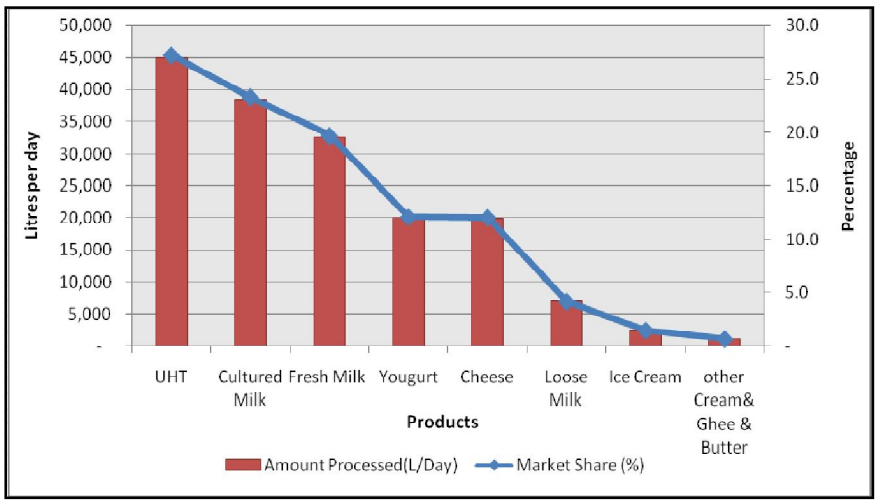



**Figure 9: Market Share of Dairy Products Processed in Tanzania**

Source: TAMPA, 2016

### 3.1.7 Milk processing challenges

Recent studies (TAMPA 2016, URT 2016) show that most milk processors are having difficult times and are not operating near capacity. Different reasons for failure to operate at full capacities are given including: seasonality in the supply of raw milk, whereby very little milk is supplied in the dry seasons and some plants such as Kilimanjaro Creameries, Tan Dairies and other entrepreneurs in Dar es Salaam have opted to temporally close-down their plant and distribution facilities during this period in order to avoid losses; failure to access good and reliable markets is one of critical problems, and this has been caused by high transport costs involved in transporting the products to the markets; use of low technology whereby products stay for very few days on shelves before getting spoilt; and lack of proper milk transportation facilities; and lack of dairy trained personnel were also cited by processors as among the obstacles hindering them from operating at full capacities.

There is no packaging material production factory in the country and therefore importing them from outside the country adds more cost to the milk processing. Other reasons, which were mentioned, include low purchasing power of consumers, and difficulties in obtaining certificate from Tanzania Bureau of Standards (TBS). For example, until today MMCL has yet to get TBS certification because of high solid -not -fat (SNF) content; second samples were taken by TBS after introducing the corrective measures, but there is no feedback until today. This has led to some loss of clients and revenue. For example, Jambo and Nchubi Supermarket in Mwanza and Eden Supermarket in Shinyanga wanted to procure MMCL products but could not do so because of lack of TBS certificate. Other challenges mentioned by stakeholders include changes in government policies on milk, multiple regulations and fees on milk products which include requirements by Tanzania Food and Drugs Authority (TFDA), Occupational Safety and Health Authority (OSHA), Tanzania Bureau of Standards (TBS) and Tanzania Dairy Board (TDB); and limited capital of processors to buy all facilities required to handle milk and milk products.

### 3.1.8 Milk production, offtake, marketing, processing in the Lake Zone milk shed area

Table 5 presents a comparison of milk collection capacity between Lake Zone regions and other leading regions in Tanzania. As seen, with the exception of Mara Region that has a long established history of formal milk processing, most regions are still lagging far behind. This could be an opportunity for MMCL to establish itself and expand in markets such as Kagera, Geita, Mwanza, Mara, Tabora, Kigoma, Simiyu, and Shinyanga.

**Table 5. A comparison of milk collection capacity between selected Lake Zone regions and other areas in Tanzania**

| Region | Number of collection centers | Installed capacity/day | Volume collected per day | % Capacity utilization | Average milk Vol. collected per Installed unit/d |
|---|---|---|---|---|---|
| Kagera | 3 | | 150 | | 50 |
| Mara | 57 | 92,000 | 12,500 | 14 | 219.3 |
| Mwanza | 1 | | 1,500 | | 1500 |
| Tanga | 42 | 95,500 | 40,734 | 42 | 989.9 |
| Arusha | 16 | 22,100 | 3,280 | 15 | 205 |
| Morogoro | 9 | 19,300 | 6,266 | 32 | 696.2 |
| Mbeya | 26 | 17,328 | 19,874 | 115 | 764.4 |
| Kilimanjaro | 9 | 10,400 | 3,580 | 34 | 397.8 |
| Iringa | 12 | | 3,255 | | 271.3 |
| Pwani | 26 | 5,950 | 2,998 | 50 | 374.8 |

Source URT (2016)

## 3.2 Marketing function

The dairy subsector may provide a source of growth and employment opportunities in Meatu district, especially along the entire value chain that will be created by expanded MMCL, which will touch different people and create businesses of different kinds. Expansion of MMCL may facilitate investment flows from dairy cattle keeping, feed production, milk production and processing to marketing of milk products, not only in Meatu District but also in other districts in Simiyu Region, and beyond.

The Lake and Western Zone market that expanded MMCL is targeting has the same characteristics as the rest of Tanzania in that about 90% of the milk of the produced milk is consumed on the farm and barely 10% is marketed with only 3% being formally processed[5]. On the other hand Tanzania is a net importer of processed milk products to

[5] The comments from milk suppliers to MMCL reiterated the same. During fields visits in restaurants and *Mama Lishe* in Meatu, clients preferred cultured milk prepared by the joints. The reason is because that is the taste they are used to and is affordable. However, as to yoghurt they preferred MMCL products and their flavors.

the tune of 70 million LME on average USD 20 million per annum. This indicates that marketing of expanded MMCL products will be an uphill challenge that needs to be strategically addressed.

From the desktop research, field visits and stakeholder consultations the following key points emerged as to marketing of products from the expanded MMCL:

i. Tanzania's population which is growing at a rate of 2.7%. It is expected that the population of URT will be about 65 million by 2030, with youth below 30 years constituting about 65% of the population[6]). To succeed in the market MMCL should develop and deliver plain and flavoured dairy products that are in small sizes packaging, affordable, and are targeted to entice the youth's tastes and health preferences, e.g. natural fruits additions;
ii. Consistent and adequate supply of milk for processing and robust marketing of MMCL products will be the most important functions that to a large extent will determine the level of revenue streams, MMCL performance, and profitability. In view of the foregoing, the expanded MMCL should:
    a. Recruit and compensate well highly knowledgeable, skilled, committed, and competent teams of milk supply chain management specialists (two people), and experienced marketers (three people). At least one member of the team should have worked in the same capacity in the milk industry in Tanzania or East Africa;
    b. Devise and implement a competence framework for the two teams.
iii. Expanded MMCL should exploit immediate demand for dairy products that is and will be created by the rapid human migration to town centers and urban nodes, as people shift to look for decent employment opportunities and migrations caused by displacement from intensification of agricultural production;

[6] The age structure of Tanzania is : **0-14 years:** 44.6% (male 11,173,655/female 10,962,186);**15-24 years:** 19.5% (male 4,838,216/female 4,841,338); **25-54 years:** 29.5% (male 7,340,129/female 7,289,483); **55-64 years:** 3.5% (male 745,214/female 985,524); **65 years and over:** 2.9% (male 629,483/female 833,910) (2014 est.)

.

iv. MMCL should focus on a wide narrative, beginning with forcefully entering the Lake zone market and after consolidation move east and southward Tanzania. MMCL should begin with establishing and strongly positioning itself using distributing agents and setting up own MMCL shops and dairy shops in strategic populous areas in Mara, Simiyu, Shinyanga, Mwanza, Geita, Kagera, Kigoma, Tabora, Singida, Dodoma, Dar es Salaam, Zanzibar, Pemba, Mtwara and Lindi. To begin with, MMCL should develop a marketing strategy and plan and identify more profitable sites, channels, and advertising approaches to use in the immediate and medium term;

v. Concurrent to the above, significant marketing focus should be placed on smart marketing that takes into consideration the following issues:

   a. Continuous market research and products upgrades to sustain and grow MMCL's market share in its strongholds and emerging areas, e.g. in emerging industrial zones, tourist areas, extractive industry areas in Mtwara, Lindi, Mchuchuma and Liganga, small scale mining sites, etc;
   b. Issues of regional, national and global level competitiveness (MMCL strategy-milk supply and prices, structure, rivalry, changing demand conditions, EAC and SADC and global milk products market dynamics, trends and interventions), technology and production and business processes and practices changes, customer relations management, branding, compliance to quality and safety standards and buyer and consumer needs and requirements, learning and fast readjustment/re-engineering, resilience (adapting and evolving), utilities dynamics, social change, and fair and ethical trade and sustainability issues should always be considered upfront in market planning, product design, manufacturing, and distribution;
   c. MMCL should always strive to provide fast and smart offerings and services to its customers and quickly address customer views, response to complaints and feedback[7];

[7]During field visits to shops selling MMCL products in Meatu, the Lissa shop situated just 400m from MMCL stopped buying MMCL cultured milk and yoghurt from January 2017 because they received a supply with a short expiry date. Shortly the products expired and it was detected by a customer. So the shop had to discard all the consignment of 20 bottles. It is during the researchers visit that this issue came up and our guide Mr. Ibrahim Ponzi, Planning Officer, DC, pleaded with the owner to rectify the issue, and through a phone call to MMCL leadership the issue was resolved. And Lissa shop made an instant order for the next consignment. A simple

vi. Commission a marketing expert with knowledge in Tanzania's milk industry and related competitive forces to develop a robust marketing strategy and budgeted plan of action for expanded MMCL products for the initial three or five years. MMCL should mobilize and allocate resources to execute the strategy and plan;

vii. MMCL management should immediately start developing a supply chain for milk, including milk producer-MMCL business linkages, to ensure a consistent and unfettered supply of milk at reasonable prices and in real time;

viii. A rapid mindset change should take place in MMCL leadership and staff to inculcate and adopt solutions to a significant movement towards embracing new technology and incorporating efficiency enhancing techniques and best practices, use of new communication tools such as digital marketing, improve service delivery, and mechanisms to increase MMCL growth and sustainability, such as a competence framework and real-time monitoring and evaluation and readjustment measures/initiatives. The transformative impact of this may be increased productivity and revenues and profits. The drawback of this development may be the disruption of current employment for the unskilled founders and youth in the expanded MMCL;

ix. In the societies that MMCL intends to capture markets there is a tremendous need for awareness on the value and benefits of MCCL milk products for generating upstream value to MMCL suppliers, downstream entities dealing with MMCL products (net commercial gains and profitability), and health benefits. Note that the Lake Zone and Western Tanzania has childhood stunting of 42% (World Bank 2013; Feed the Future, 2016)[8]. Awareness may require a multi-

penetration test or Customer Relations Management exercise, including continuous follow up and addressing feedback, could have averted such disasters and loss of clients and revenue.

[8] Stunting occurs when children do not receive adequate nutrition for proper growth Mr. Obey N. Assery, the Director of the Department of Coordination of Government Business has recently said that underweight, stunting and wasting are caused by not by having enough food but due to lack of knowledge; the issue is one of gender and malnutrition.

disciplinary approach. Therefore, we advise MMCL to collaborate with institutions present in Simiyu or national institutions such as TNFC, TAMPA, Ministry of Health, NGOs, and Development partners in this endeavor, starting with an integrated and holistically designed outlook to offer keen avenues for reaching prospective MMCL clientele.

## 3.3 Consumer demand analysis

### 3.3.1 Domestic milk consumption

Consumption of fresh and fermented liquid milk dominates in Tanzania and other East African countries show narrow dairy products range (Omore *et al*., 2009). However, according to FAOSTAT, Tanzania's annual per capita consumption of milk has been gradually increasing over time, from 19.69 kg/capita/yr in 2010 to 23.51 kg/capita/yr in 2013. According to the MALF data (MALF, 2017), the average consumption of milk is 47 L/capita/yr. This value, is well below the FAO recommended rate of 200 L/capita/yr. Therefore, with increased awareness that may change consumer behavior, there is ample room for MMCL quality products to find a foothold in the dairy market and gain market share with time.

Other countries with a high average annual per capita consumption level of milk include Kenya (105 kg/annum), India (68 kg), USA, (261 kg) and Australia (248 kg).

A study by Covarrubias et. al.(2012) showed that in rural areas, most of the milk is consumed at home. The dairy consumption is almost equal in both rural and urban areas, i.e., 14.64 L and 15.61 L, respectively. In addition, as shown in Table6, the total value of expenditure on fresh milk and dairy products is double in urban areas compared to rural areas.

The study further reveal that rural households that do not participate in livestock production purchase a much greater quantity of dairy products. And for those that undertake livestock production, dairy products account for more than 33% of livestock products consumed.

Hence, it would be prudent for MMCL to focus their marketing plans towards town centers

**Table.6: Per capita value of dairy and livestock product consumption**

| Product | Urban (TZS) | Rural (TZS) |
|---|---|---|
| Dairy | 12,021 | 7819 |
| Other dairy products | 1012 | 1985 |
| Fresh milk | 9909 | 5414 |
| Butter | 1100 | 420 |
| Total value | 71,822 | 36,541 |

Source: Covarrubias *et al*. (2012)

Table 7 presents an estimated milk supply and demand in Tanzania from a TAMPA study. The study indicates that the domestic supply alone does not meet the local demand for milk and milk products. The estimated current formal milk consumption is about 112 million liters. This figure is conservative as it does not include milk consumption most of the remote rural areas, which do not go through the market, which is estimated to be 90 per cent of the total domestic milk production.

**Table.7: Estimated Milk supply and demand in Tanzania in litres (Without Imports)**

| | 2014 |
|---|---|
| Total Milk processed (l/day) | 166,620 |
| Less: Azam Dairies | 45,000 |
| Local milk processed (l/day) | 121,620 |
| Local milk processed (l/yr) | 44,391,300 |
| Add: total milk imports (l/yr) | 68,775,066 |
| Total Supply of marketable milk (l/yr) | 113,166,366 |
| Less: Exports | 394,992 |
| Total Domestic Consumption (Demand)(l/yr) | 112,771,374 |

Source: TAMPA, UNCOMTRADE

Barriers to distribute milk from surplus to deficit regions due to poor transport infrastructure, and seasonal variation experienced by the country are among the major factors creating artificial shortages in many areas of Tanzania. Seasonal variation in Tanzania has tended to cut down domestic supply by between 30 to 60 per cent per annum which is disquieting. Local processors, farmers and the local milk industry in general are the most affected parties due to seasonal variation especially during peak season when huge imports flood and saturate the local market.

This persistent shortage has therefore tended to attract disorganized imports to the extent that some of the imports are not officially recorded, thus making most policies and regulations including the monitoring system ineffective. The share of imported milk and milk products in domestic market is therefore very high. Lack of Ultra High Temperature (UHT) processing plants in the country for example has led to an influx of imported long-life milk from other African countries. This may be an opportunity area for entrance for MMCL.

## 3.4 Milk trade and Distribution

*(a) Raw milk Traders*

Poor road infrastructure makes it difficult to transport raw milk to individual consumers and milk processing plants in towns. In dry seasons, the situation is worse because milk reaches the town markets when its temperature is above the minimum requirement for milk to be processed. At the same time cow's productivity diminishes further due to shortage of grass and water and hence little amount of milk is available for traders to supply to the markets in town. Traders supply much of the available milk to individual consumers than to processing plants because the former pay higher price and in cash. In addition, there is no quality control in the informal markets allowing traders to sell poor quality milk that would be rejected by processors. Therefore plants get milk less than what they need and hence the plant capacity utilization tend to diminish even further. To address these problems, processors at their own transport costs go directly to producers in rural areas and buy milk. This however, creates conflict between them and traders (middlemen) who have been contracted to supply milk to the processing plants. Further, some farmers and traders take advantage of the situation and add water in the milk for higher profit.

During rainy seasons, the situation takes another form, as there is excess supply of milk, and some areas become inaccessible, which pushes prices down; but much milk remains unsold and perishes due to un-proportionate rise in supply. While, plants get enough milk to process, traders compete for individual consumers by reducing their prices. The main challenge traders get during this season is the fall in quality of milk due to increase in water content, and therefore failing to meet the requirement by the processing plants. This makes processors offer lower prices than that offered by individual consumers. Another challenge is the failure of processing plants to pay them in time or sometimes no payments are made for milk supplied. Some plants have closed down without paying traders their dues. Consequently, traders sell milk to plants only if there is no alternative buyer. This sometimes affects farmers who sell milk to middlemen on credit, waiting to be paid after the middlemen are paid by processors. Traders have also been complaining about hygiene of milk supplied by farmers. The environment in which farmers are milking cows and keeping milk is often of poor hygiene.

Lack of infrastructure like water and electricity supply systems make traders fail to buy milk in bulk, as it is not easy to store milk and maintain hygiene. Traders do not feel any threat from imported milk but claim that they were very much affected by the closure of processing plants, which occurred before 2010, as the market of their milk shrank significantly.

*(b) Retailers of processed milk products*

Generally traders of processed milk products find locally processed milk less competitive when compared with imported milk and that powder milk is less traded than liquid milk because powder milk is more expensive. In rural areas many consumers do not know Azam milk and the supply has been low. They argue that locally processed milk products are not competitive compared with imported ones because their supply is unreliable, they have very short shelf life and they are packed in low quality packaging materials. The information on the package is not enough to convince potential learned consumers. The products get into the market without any advertisement to inform consumers.

Though they understand how unfair competition is in the domestic milk market, traders do not see the impact of imported milk has on domestic processed milk because the existing demand gap for milk products is big. However, they understand that having locally processed milk stimulates the economy as farmers will have market for their milk and more employment will be created.

## 3.5 The Competition

Our field visits in shops in Simiyu and Mwanza in the Lake Zone indicate that MMCL is going to face competition from home made products and emerging local producers of milk products that are encouraged by various programs such as those by MALF, SUA, Tanzania Dairy Enterprise Initiative by USAID, East African initiatives, and small ones such as Nyuki in Bunda, Mara Milk, etc.

At national level MMCL will face stiff competition from established firms such as Tanga Fresh, Azam Dairies, ASAS, and Dar Fresh. Imports from Kenya, Netherlands, New Zealand, Saud Arabia and South Africa where most of imported milk products come from, may also affect the competitiveness of MMCL and it may have to continuously work hard to enhance cost effective production.

As to foreign brands, powder milk from NIDO, Cowbell, and unbranded products from Gulf countries via Zanzibar and UHT milk from Kenya and South Africa will be the greatest competitors of MMCL liquid milk products.

In addition to this, the recent July 2017 agreement between Tanzania and Kenya that allows unfettered importation of dairy products from Kenya will pose even a much bigger

challenge. In addition, the imported liquid and powder milk in Tanzania will present a lot of competition to all processed milk products by MMCL. This competition may exert a lot of pressure to expanded MMCL and make it earn less revenue.

In view of the above it proposed that the expanded MMCL compete based on:

i. Price- this should go hand in hand with continuously cutting the cost of production and raising the aggregate efficiencies through introduction of best practices, techniques, and technologies and capacity building of employee s;

ii. Quality and safety of its products;

iii. On ethical and social responsibility grounds; initially based on social and environmental standards (the authors saw various indigenous peoples cattle farmers at the weekly market in Bukindu Ward); and

iv. Speed to market- All major producers of processed milk products are situated in Eastern, Northern and Southern Tanzania, and imported milk products are mostly marketed in those areas. Hence they will have longer cycle and lead times than MMCL.

In addition to the above, MMCL will have to invest in quality and attractive, bar-coded packaging and strong marketing. Poor packaging and inadequate advertisements are what is slowing down the growth of most processors in Tanzania (Watuta Yahya, 2017).

## 3.6 Technical Feasibility for the expansion of business of the Meatu Milk Company Ltd.

### 3.6.1 Milk plant expansion goals

The main objective of the project is to grow the dairy industry in Meatu by improving milk production by increasing the number of producers in 30 villages of Meatu District to at least 400 and the average yield of cows from the present 2 litres to 4 litres per cow/day for local breeds and up to 30 litres/cow per day for crossbred dairy cows from MMCL own dairy farm and contracted farmers. Improvement in milk production will be necessary in order to supply enough milk to the planned construction of a new processing plant with a capacity of 2,000 litres/hr. or 15,000 litres per single shift, 8hr workday with capacity to produce a variety of added value dairy products in addition to yoghurt that is currently being produced. Ultimately the MMCL aims at increasing number of youth directly engaged in milk production, collection, processing, quality control, product marketing and retailing operations in the district.

### 3.6.2 Milk plant site location and related infrastructure

Subject to availability of sufficient milk and other pre-requisites, the present mini milk-processing factory with a capacity of 800 litres per day in Mwanhuzi town, Meatu district will be expanded to the planned 15,000 L/day medium scale milk processing plant. The plant will be supported by a net work of milk collection points (MCPs) and cooling centres strategically located at selected sites on basis of concentration of milk producers sufficient to support economic operation of the milk cooling centres (MCCs) Experiences elsewhere in East Africa during the implementation of the East Africa Dairy Development phase I (EADD I) has shown that to be viable, MCCs should be able to collect a minimum average of 700 litres per day. Possible locations include 30 villages of Mwabuzo, Imalaseko, Mwabalebi, Mwamanongu, Mwanzugi, Igushiru, Nata, Bukundi, Kabondo, Ng'hoboko, Mwamalole, Mwanjolo, Mwamanimba, Bulyanaga, Lata, Buhangija, Mbushi, Jinamo, Mwabagimu, Mwangudo, Makao, Nkoma, Paji, Mwabagosha, Sapa, Irambandogo, Lukale, Usiulize, Dakama na Mwamanoni ( Fig 1).

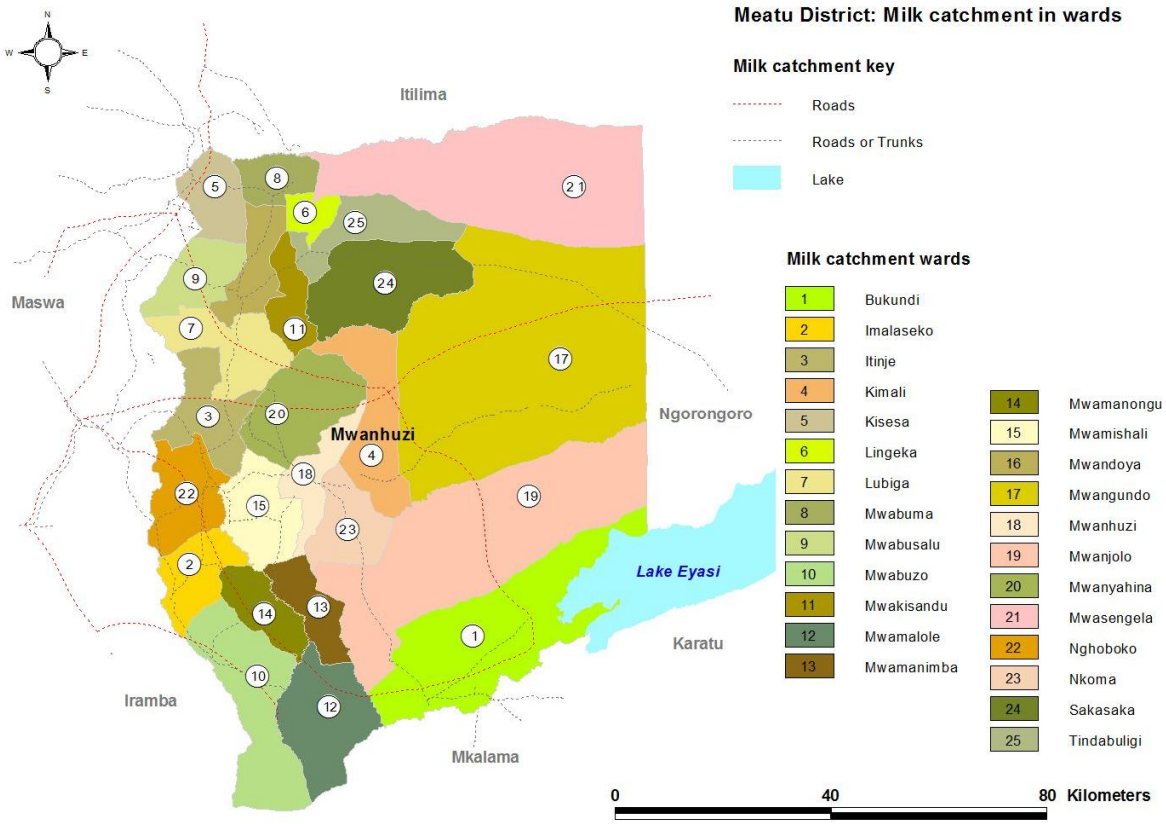


Fig .10: Locations of potential milk production and collection villages (sites) in Meatu District

### 3.6.3 Analysis of Milk production, offtake and availability of marketable surplus in Meatu District and environs for processing by MMCL

#### *3.6.3.1 Milk production and offtake*

Based on extrapolations from the livestock census data for Meatu District (NBS, 2012), the estimated milk production is shown in Table 8. It is assumed that 20% of indigenous cattle are lactating cows which produce an average of 160 litres of milk per lactation year above the calf requirement. Approximately 40% of the improved dairy cattle is assumed to be mature cows of which 68.8% are lactating and produce an average of 1700 litres per lactation-year. Further assumptions are that 30% of milk from the traditional cattle and 70% of milk produced from the improved dairy cattle is marketed off-farm (SUA/MoAC/ILRI, 1998).

On the basis of these assumptions, the milk offtake from both indigenous and improved cattle is shown in Table 8. The spatial distribution of the milk offtake is given in Fig. 2. The spatial distribution and road infrastructure will influence the location of the milk collection points and chilling centres.

## Table.8 Milk off take from 25 villages in Meatu District

Milk offtake estimates from 25 vilages in Meatu District (ata source: MDC, 2012?)

| S/N | location | nous cattle | Indigenous cattle Milk offtake/annum1) | Improved dairy cattle | Improved cattle Milk offtake2 | Total milk offtake/annum | Marketable milk | 100% marketable milk/day sold to milk plant?? | 50%of markeatble milk sold to milk processing plant | 30% of marketable milk sold to processing plant | 15% of milk sold to processing plat |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **BUKUNDI** | **60,422** | **1,933,504** | **-** | **-** | **1,933,504** | **580,051** | **1,589** | **795** | **530** | **237** |
| 2 | **MWANJOLO** | **27,889** | **892,448** | **-** | **-** | **892,448** | **267,734** | **734** | **367** | **245** | **109** |
| 3 | **MWANGUDO** | **23,163** | **741,216** | **-** | **-** | **741,216** | **222,365** | **609** | **305** | **203** | **91** |
| 4 | **MWAMALOLE** | **19,017** | **608,544** | **-** | **-** | **608,544** | **182,563** | **500** | **250** | **167** | **75** |
| 5 | **ITINJE** | **18,248** | **583,936** | **-** | **-** | **583,936** | **175,181** | **480** | **240** | **160** | **72** |
| 6 | NG'HOBOKO | 15,232 | 487,424 | - | - | 487,424 | 146,227 | 401 | 200 | 134 | 60 |
| 7 | MWABUZO | 14,904 | 476,928 | - | - | 476,928 | 143,078 | 392 | 196 | 131 | 59 |
| 8 | LUBIGA | 14,084 | 450,688 | - | - | 450,688 | 135,206 | 370 | 185 | 123 | 55 |
| 9 | KISESA | 13,734 | 439,488 | - | - | 439,488 | 131,846 | 361 | 181 | 120 | 54 |
| 10 | MWABUSALU | 13,083 | 418,656 | - | - | 418,656 | 125,597 | 344 | 172 | 115 | 51 |
| 11 | MWAMISHALI | 10,697 | 342,304 | - | - | 342,304 | 102,691 | 281 | 141 | 94 | 42 |
| 12 | TINDABULIGI | 10,604 | 339,328 | - | - | 339,328 | 101,798 | 279 | 139 | 93 | 42 |
| 13 | MWABUMA | 10,571 | 338,272 | - | - | 338,272 | 101,482 | 278 | 139 | 93 | 41 |
| 14 | MWAMANONG | 10,555 | 337,760 | - | - | 337,760 | 101,328 | 278 | 139 | 93 | 41 |
| 15 | IMALASEKO | 10,388 | 332,416 | - | - | 332,416 | 99,725 | 273 | 137 | 91 | 41 |
| 16 | KIMALI | 9,741 | 311,712 | - | - | 311,712 | 93,514 | 256 | 128 | 85 | 38 |
| 17 | NKOMA | 9,687 | 309,984 | - | - | 309,984 | 92,995 | 255 | 127 | 85 | 38 |
| 18 | MWAMANIMBA | 9,158 | 293,056 | - | - | 293,056 | 87,917 | 241 | 120 | 80 | 36 |
| 19 | MWASENGELA | 9,100 | 291,200 | - | - | 291,200 | 87,360 | 239 | 120 | 80 | 36 |
| 20 | SAKASAKA | 8,593 | 274,976 | - | - | 274,976 | 82,493 | 226 | 113 | 75 | 34 |
| 21 | MWANYAHINA | 8,329 | 266,528 | - | - | 266,528 | 79,958 | 219 | 110 | 73 | 33 |
| 22 | MWANDOYA | 7,857 | 251,424 | - | - | 251,424 | 75,427 | 207 | 103 | 69 | 31 |
| 23 | LINGEKA | 6,530 | 208,960 | - | - | 208,960 | 62,688 | 172 | 86 | 57 | 26 |
| 24 | MWANUHUZI | 5,983 | 191,456 | - | - | 191,456 | 57,437 | 157 | 79 | 52 | 23 |
| 25 | MWAKISANDU | 5,820 | 186,240 | - | - | 186,240 | 55,872 | 153 | 77 | 51 | 23 |
| | **Grand total** | **353,389** | **11,308,448** | **125** | **58,480** | **11,366,928** | **3,433,470** | **9,407** | **4,703** | **3,136** | **1,404** |

Note: [1)] Assumption: 20% of indigenous cattle are lactating cows producing 160 litres per lactation year above calf requirement

[2)] Assumprtion: 40% of improved dairy are mature cows of which 68.8% are lactating and produce 1700 liter per lactation year (MALD, 1987)

[3)] Assumption: 30% of indigenous cattle milk is marketed offfarm; (SUA/MoAC/ILRI, 1998)

[4)] Assumption: 70% of improved dairy cattle is marketed offfarm (SUA/MoAC/ILRI, 1998)

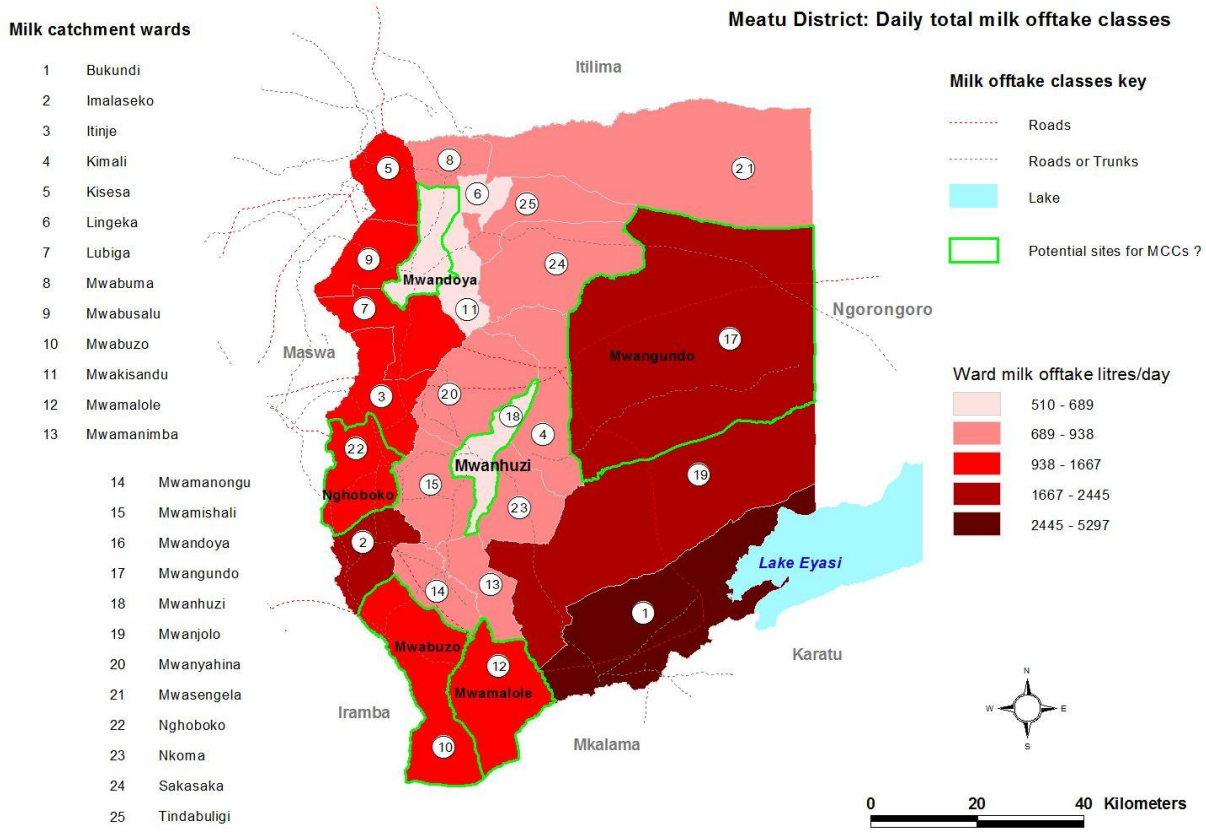



Fig. 11: Estimated spatial distribution of milk in Meatu District (litres/day)

Bearing in mind that on average 86% of milk produced in Tanzania is sold to neighbours and local markets near to the point of production (NBS 2003), marketable milk surplus could reasonably be in the range of 15-30% of the total milk offtake (9 407 litres/d). Tanga Fresh Ltd, the largest processor in Tanzania, owning over 40 milk cooling centres manages to collect 60-65,000 litres/day during the flush season in a milk shed spanning from Lushoto, Korogwe, Muheza, Pangani and Handeni Districts in Tanga region and from some milk pockets in Bagamoyo, Mvomero and Kilosa Districts in Coast and Morogoro region respectively (source: Tanga Fresh Records 2013; Kurwijila 2013:p.61) . Milk intake decreases to as low as 20,000 during the dry season (TFL Records, 2017). The Tanga Fresh milk catchment area has been estimated to have improved cattle population of about 90,000 and 1.14 million indigenous cattle (Table 9). Total marketable milk offtake is about 196,000 litres/day contributed by Tanga (95,000 l) Coast Region (50,000) and Morogoro (50,000 litres) (Kurwijila 2013:p.61). On average Tanga Fresh therefore collects 33% of available milk during the flush season and 15.3% during the dry season. In Mara region, with a total investment capable of processing

over 100,000 litres/d at Musoma dairy and New Mara Dairy and other small scale processors, and marketable surplus estimated at 45,000 litres/day, processed not more than 15,000 litres/day in 2012 (Kurwijila 2012:p.13).

Table.9: Tanga Fresh Milk Catchment area cattle population

| District | Improved Dairy cattle | Indigenous cattle |
|---|---|---|
| Lushoto | 49,155 | - |
| Tanga | 9,799 | - |
| Kilindi | 306 | - |
| Pangani | 3,950 | - |
| Mkinga | 2,550 | - |
| Handeni | 1,045 | - |
| Korogwe | 4,600 | - |
| Korogwe urban | 768 | - |
| Muheza | 6,906 | - |
| Total for Tanga Region | **79,079** | **688,114** |
| Bagamoyo | 0 | 270,000 |
| Mvomero | 10,744 | 70,000 |
| Kilosa | 885 | 114,652 |
| Total for Tanga catchment area | **90,708** | **1,142,766** |

Channeling of marketable milk to milk processing factories remains a big challenge in Tanzania. Reasons include subsistence nature of milk production, especially from the traditional cattle keepers, for whom milk is major food items in their diet. Secondly the scattered natured of milk production combined with poor road infrastructure in rural areas makes the setting up milk collection centres uneconomical or difficult to operate, especially during the rain season. Fig 3 shows the mismatch between investments in milk processing plants and milk collection infrastructure in some key milk shed regions in Tanzania.

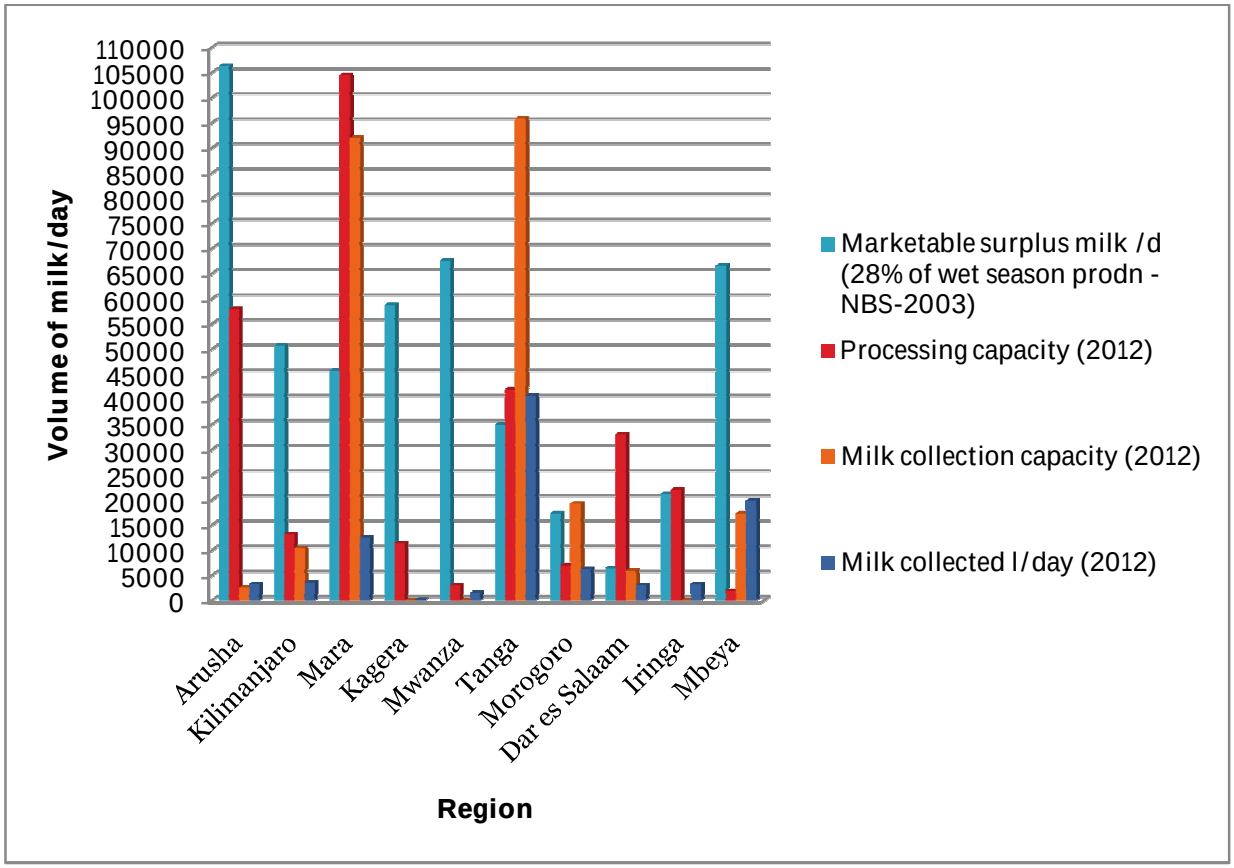



**Fig 12: Gap between investments in milk production, collection and processing in various regions in Tanzania (NBS, 2003 and TDB, 2012)**

These data indicate that without special interventions, milk potentially available for processing in Meatu district is in the range of 1,404 to 3,136 litres per day. With concerted efforts, 50% of available, i.e. 4,707 l/day could be delivered to the MMCL plant for processing. It is obvious that in order for the MMCL plant to collect and process 15,000 l/day, the milk catchment area must be extended to other areas with identified marketable milk surplus within Simiyu Region and beyond, as along as it technically and economically feasible to do so. As the milk collection distance increases the likelihood of higher milk losses due to spoilage and the cost of collection per litre of milk will tend to increase. Moreover, strategies to expand the dairy cattle herd to a level that can supply consistent and economical quantities of good quality milk need to be put in place. These are described under section 3.5.6 Estimates of spacial distribution of marketable milk per day is shown in Fig.13.

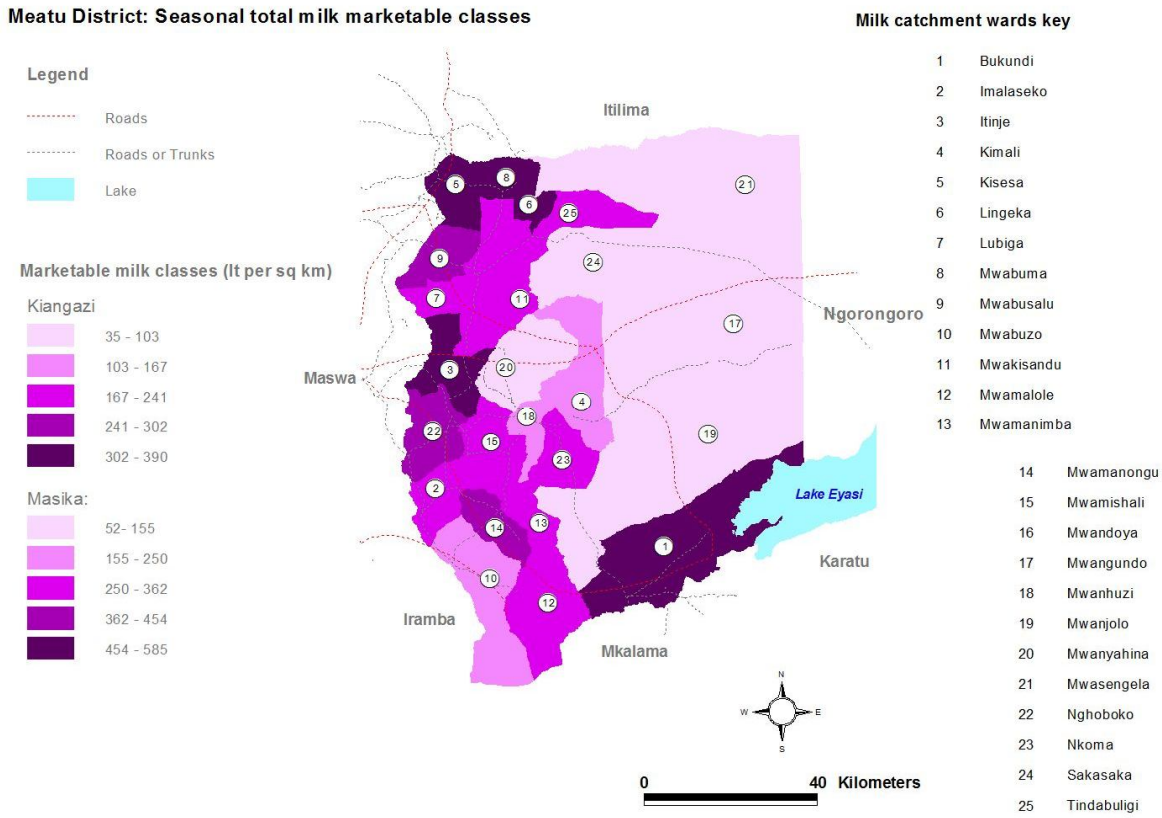



Fig 13: Spacial distribution of marketable milk surpluses in Meatu District

Consultation with the MMCL owners and other stakeholders led to the selection of the following wards and villages as sites for establishment of milk collection centers: Mwanjoro (Bukindi, Jinamo, Mbushi, and Chambare) [9]; **Mwangudo** (Paji, Sungu, Iramba Ndogo, Mwanyagula); **Mwandoya** (Lubija,

[9] Each village may produce more than 500 L of milk daily.

.

Igobe, Mwakisando, Mwakaluba, Inonelwa, Makomangwa, & Nyanza); **Mwamalole** (Usiulize, Lata and Mwangikuli); **Itinje** (Minyanda, Mwasungura, Mwageni, Mwafunguti, Mwagai, and Isengwa); **Ngoboko** (Bulyaashi, Kabondo, Isebanda, and Nata); **Mwambuzo** (Imalaseko, Mwamanoni, Mwanzugi, and Mwabalebi); This may need to be reconsidered in relations to the spacial and seasonal distribution of potential marketable milk availability shown in Fig 3.10 above.

### 3.6.4 Milk processing performance by MMCL

The MMCL plant has a capacity of 800 litres/day. Since its started operations in October 2016, the plant has until June 2017, received a total of 22,223.5 litres or an average of 81.4 litres/day (Fig 14). This amount of milk is too small for economical and sustainable milk processing business. Strategies to grow the milk production will be needed, both in the medium and long term perspective.

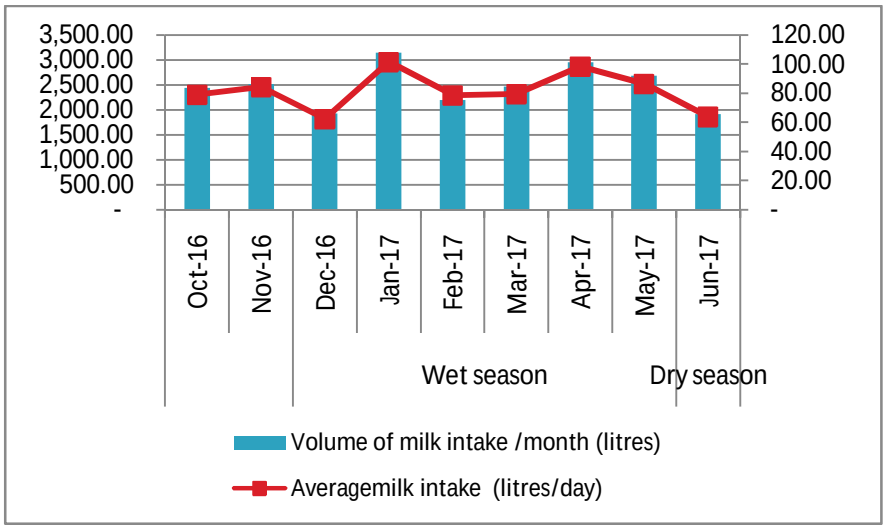



**Figure 14 Dry and wet season milk intakes at MMCL dairy plant from October 2016-June 2017 (Data Source: Field survey, 2017)**

### 3.6.5 Milk procurement arrangements and intake projections

In this report we propose introduction of 200-400 in-calf heifers per year for five consecutive years . A ten years projection on numbers of cows and amount of milk expected to be produced is given in Tables.10 Figures 15a=15c. The assumptions used in the projections are were as follows:

1. Calving rate in the second year after introduction was assumed to be 95% because in-calf heifers are introduced. The 5% shortfal could arise out of wrong pregnancy diagnosis and late pregnancy abortions because of transportation stress.
2. Subsequent annual calving rates will be 60% similar to what Mchau et al. (2009) used in their estimated of potential milk availability in the central corridoe of Tanzania (Morogoro, Dodoma, Singida, Tabora, Manyara and Shinyanga
3. Adult mortality rate of 3% for various reasons
4. Annual milk production per cow of 1,700 litres because of low concentrate supplementation. Mchau et al. (2009) used a figure of 1500 litres for Mpwapwa cattle but a review by Mgeni (2010) showed smallholder farmers with crossbred cows could produce 1400 to 1950 litres per lactation. Generally, milk yield increases with parturition number.
5. Male to female ratio among new born calves of 50:50
6. Survival to first calving of 70% (mchau et al , 2009)
7. Number of lifetime calvings of 7 although in large scale farms the mean is low (about 5).

The levels of investiment will depend on resources available but more importantly **availability of farmers willing to adopt modern dairy farming as a business**. We considered three scenarios ranging from introduction of 200 heifers annually to 400 heifers annually. The financial implications are T.shs 2, 3 and 4 billion required to meet the cost of supplying 200, 300 and 400 heifers annualy over a period of 5 years. This would involve training and preparing between 1000 to 2000 smallholder farmers to adopt **contract dairy farming**, that would be given cows on credit and repay the loans by supplying milk to the designated milk collection centres for a specific period until the loans are repaid. In Tanga practicing farmers have acquired heifer-credits under this kind of arrangent (***kopa ng'ombe-lipa maziwa***) under a programme managed by Farm Friends Tanzania Ltd and Tanga Dairy Co-operative Union Ltd (FSDT,2011). An alternative approach is to encourage the setting up of mediumm scale dairy farms of 10-30 dairy cows on specially designated pieces of land (10-30 acares) supplied with requisite infrastructure such as water, electricity and roads. A youth dairy scheme was setup in Tanga under the Netherlands assisted Tanga Dairy Development Programme (TDDP) and TADAT (Tanga Dairy Trust) using this model of seting up small and medium scale farms in the Pongwe area in the peri-urban area of Tanga in the early 1990s.

The projected dairy cow herd over a 10 year period is shown in Table .10 . The dairy cow herd would grow from the current 125 cows to 2000 to 4000 depending on the level of investment. Subequently, the volume of milk that would add more than 10,000 litres/day to the current estmated 3-5,000 litres to be marketable milk

available from the traditional cattle herd. This would make the operation of a 15,000 litre per day dairy plant technically feasible subject to other conditions such as milk quality aspects.

**Table 10: Ten years projection of milk cow herd growth under three scenarios of heifer injection per year under three scenarios of heifer supply over 5 years**

| | 200 Heifers/yr. | 300 Heifers/yr. | 400 heifers.yr. |
|---|---|---|---|
| **1** | - | - | - |
| **2** | 190 | 285 | 380 |
| **3** | 257 | 385 | 513 |
| **4** | 346 | 519 | 693 |
| **5** | 467 | 701 | 935 |
| **6** | 631 | 947 | 1,262 |
| **7** | 852 | 1,278 | 1,704 |
| **8** | 1,150 | 1,725 | 2,300 |
| **9** | 1,553 | 2,329 | 3,105 |
| **10** | 2,096 | 3,144 | 4,192 |
| **Required investment (Tshs –millions)** | 2,000,000 | 3,000,000 | 4,000,000 |

Assumptions: 1).Crossbed heifers introduced at rate of 200, 300 or 400 per year over 5 years. 2) Calving rate of introduced heifers 95%; subsequent calving rate 60%, 3). Survival to first calving equal 70% 4). Age at 1st calving equal to three years**.**

Fig 15b below shows the total amount of marketable milk that would be available without dairy development program and with injection of dairy farming at three levelsof intensity (200, 300, and 400 heifers per annum for 5 years)

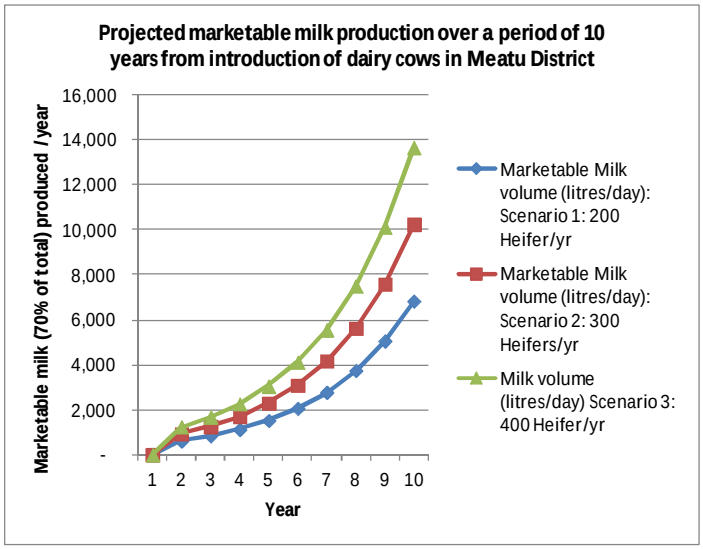



**Figure 15a: Projected marketable milk production over the period 10 years**

**Assumptions**: 1). *Milk production of heifers and cows 1,700 litres/lactation year; Marketable milk 70% of milk produced; 30% for calf and home consumption .*

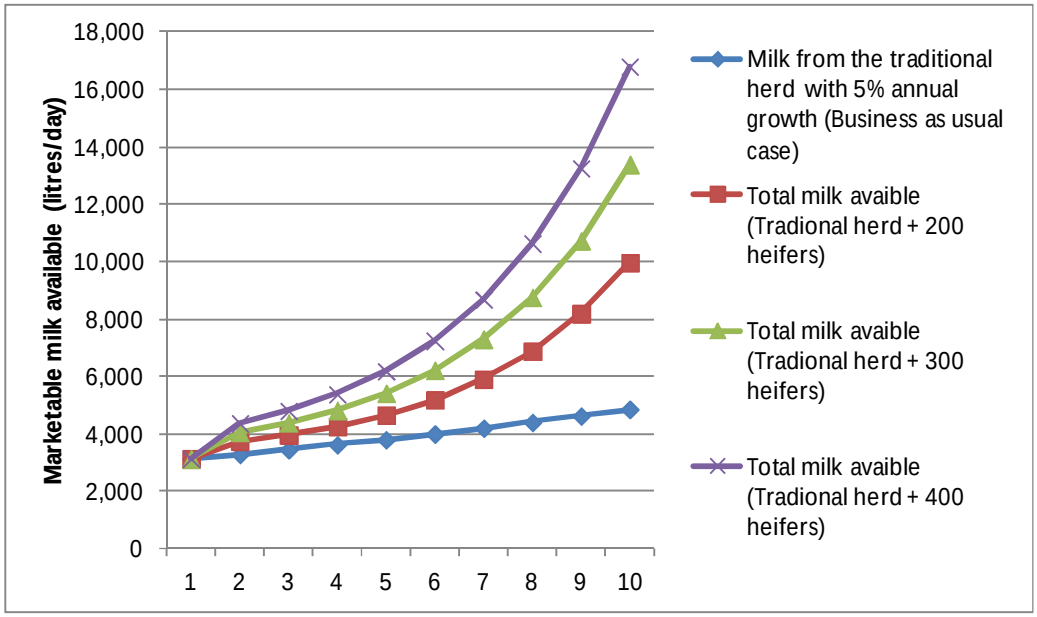



**Fig 15b; Potential total amount of marketable milk available per day from the traditional and introduced dairy heifers over a 10 year period**

The time to recover the investment of buying heifers for farmers will depend on farmers meeting production targets (1,700 litres/cow/yr), adherance to contract farming conditions , cost of milk production and profit margins for farmers. However, as a precautionally measure, a side selling rate of 30% of marketable may be assumed to take place as a potentail risk, in the calculations of volumes of milk that may be available for purchase and intake by the MMCL.

### 3.6.6 Milk processing technology options and product mix

While small milk driers of 30,000 litres per day are available, such small plants are not economically viable/competitive when compared to commercial milk drying plants processing 100,000 to 4 million litres/day. This is especially so when availability of very high quality milk cannot be guaranteed at all times. It is therefore proposed to start with a mixed product milk processing plant. Using the data collected, a technical feasibility study analysed the potential for collectable milk for processing in Meatu District, and additional investments in dairy cattle husbandry that would be needed to address the inadequacy of the traditional cattle herd to support a profitable operation of medium sized milk processing plant with a capacity of 15,000 litres per day. Based on consumer demand analysis, a product mix comprising fresh pasteurized milk, cultured fermented milk, yoghurt, Butter and ghee and cooking cheese (Mozzarella) was adopted. The economic feasibility study is based on these technical premises.

Milk processing will involve the following processes:

i) Raw Milk reception and filtration or clarification
ii) Seaparation of all or part of the milk fat for standardisation to 3.5% whole milk or fat reduced milk (2.5-2.7% fat) (temperature 40- 45 $^{o}$C)
iii) Pasteurisation. Typical temperature profiles are 74 $^{o}$C for 15 s or 80 $^{o}$C for 10 s
iv) Homogenisation of the milk (temperature 60- 65 $^{o}$C)
v) Deodorisation
vi) Further product specific processing e.g. fermentation to make youghurt or Mtindi (cultured milk; butter making or cheese making
vii) Packaging and storage, including refrigerated storage of perishable products such as pasteurised milk, yoghurt, mtindi, and butter.

The processes and equipment involved in each of the above products are described in section 3.6.7

The estimated availability of 15,000 litres of milk in 10 years implies that a plant of that size may be planned with the provision that for the first 5 years the plant will operate at only 40-50% of installed capacity, typical of most dairy plants in Tanzania.

Over the last 15 years since privatization of the dairy industry in 1995, dairy plants have operated at the rate of 25-33% of installed capacities (Table 11).

**Table 11 Utilization of installed capacities in different regions of Tanzania, 2016**

| Utilisation of installed capacities in different regions of Tanzania 2016 | | | | | | |
|---|---|---|---|---|---|---|
| **S/N** | **Region** | **No. Of plants** | **Installed Capacity** | **Utilised capacity** | **% Capacity utilisation** | **Market share** |
| **1** | Dar es Salaam | 8 | 53,000 | 15,400 | 29.1 | 9.2 |
| **2** | Unguja * | 1 | 150,000 | 45,000 | 30 | 26.9 |
| **3** | Pwani | 3 | 5,000 | 2,800 | 56 | 1.7 |
| **4** | Tanga | 4 | 53,000 | 44,600 | 84.2 | 26.7 |
| **5** | Arusha | 15 | 57,900 | 11,550 | 19.9 | 6.9 |
| **6** | Manyara | 3 | 2,500 | 1,470 | 58.8 | 0.9 |
| **7** | Kilimanjaro | 12 | 35,000 | 10,500 | 30 | 6.3 |
| **8** | Mara | 7 | 188,500 | 12,200 | 6.5 | 7.3 |
| **9** | Njombe | 1 | 6,000 | 4,200 | 70 | 2.5 |
| **10** | Mwanza | 2 | 1,500 | 700 | 46.7 | 0.4 |
| **11** | Kagera | 11 | 10,900 | 3,450 | 31.7 | 2.1 |
| **12** | Morogoro | 5 | 6,000 | 2,700 | 45 | 1.6 |
| **13** | Tabora | 2 | 16,200 | 300 | 1.9 | 0.2 |
| **14** | Iringa | 1 | 50,000 | 9,000 | 18 | 5.4 |
| **15** | Mbeya | 2 | 2,500 | 1,900 | 76 | 1.1 |
| **16** | Dodoma | 1 | 600 | 0 | - | - |
| **17** | Singida | 1 | 500 | 300 | 60 | 0.2 |
| **18** | Lindi | 1 | 500 | 300 | 60 | 0.2 |
| **19** | Shinyanga | 2 | 700 | 350 | 50 | 0.2 |
| **20** | Ruvuma | 1 | 500 | 300 | 60 | 0.2 |
| | | 83 | 640,800 | 167,020 | 26.1 | 100 |
| ***Processes mostly imported milk powder and Butter oil (BO) into UHT milk** | | | | | | |
| **Source: Tanzania Dairy Board/ MLFD Records, 2015. MALF, 2016** | | | | | | |

### 3.6.7 Product output projections and pricing structure

For a 15,000 liter/day milk supply to MMCL, we propose that the plant expands its product portifolio from yoghurt only to include pasteuirised milk (in-pouch and platic bottle packaging), cup yoghurt (plain and flavoured), Mtindi (plain and sweetened), butter, ghee and cheese in the proportions shown below.

**Table12: proportion of milk product mix of the milk intake per month of a proposed 15,000 l/day dairy plant in Simiyu**

| Product | Percent allocated to product | Volume per month (liters) | Per cent product yield less loses | Expected quantity of product per month in litres or (kg) |
|---|---|---|---|---|
| Raw milk sales | 2% | 9,300 | 98% | 9,144 |
| Pasteurised milk (3.5% fat) | 40% | 186,000 | 99% | 166,320 |
| Pasteurised milk low fat (2.5%) | 10% | 46,500 | 99% | 46,035 |
| Yoghurt | 25% | 116,250 | 98% | 113,925 |
| Mtindi | 13% | 60,450 | 98% | 59,241 |
| Cheese (mozzarella) | 6% | 27,900 | 8% | 2,232 |
| Butter | 2% | 9,300 | 5% | 465 |
| Ghee | 2% | 9,300 | 4% | 372 |
| **Total** | **100.00%** | **465,000** | | **397,734** |

The proportions of the mix can be changed according to market demand and selling price of value added products in order to maximize profits. The income from the business can be calculated using the assumptions and parameters shown in Table 13 below.

Current raw milk prices paid by processors to rural based milk suppliers and average ex-factory gate prices of dairy products are shown in Table13-1. For sales projections, annual price increased adjusted at 5-6% per annum (will be used) for making 3 year projections.

Packing is an important cost of value added product. Prevailing costs of packaging materials are shown in Table 13-2 for all products.

**Table 13-1. Prices of raw milk and value added dairy products**

| **General assumptions** | | |
|---|---|---|
| **Milk and milk products prices** | **Unit** | **Average prices 2017** |
| Plan year | | 0 |
| Purchase Raw milk price (T.Shs) | Liter | 800 |
| Selling Price for raw milk | Liter | 1500 |
| Pasteurised milk (in-pouch packed) | Liter | 2,800 |
| Pasteurised milk (low fat) per litre | Liter | 2,800 |
| Yoghurt per litre | Liter | 3,500 |
| Mtindi (cultured milk) | Liter | 3,500 |
| Cheese(Mozarrela) | Kg | 20,000 |
| Butter | Kg | 8,000 |
| Ghee | Kg | 12,000 |

| Table 13-.2: Some assumptions on financials and cost of packaging | | |
|---|---|---|
| Depreciation of Machinery and equipment/annum | Unit | 20% |
| Current interest rate | Percent | 20.00% |
| Long-term interest rate | Percent | 18% |
| Tax rate (VAT) | Percent | 18.00% |
| Payroll tax | Percent | 3.00% |
| Marketing and distribution cost per litre | T.Shs | 100 |
| Cost of plastic pouch per litre | T.Shs | 150 |
| Cost of yoghurt cup 150 mls | Tshs | 160 |
| Cost of plastic bottles for yoghurt/ litre | T.Shs | 450 |
| cost of 5 litre plastic gallon | T.Shs | 1500 |
| Butter wrappers, 500 g | Tshs | 200 |
| Cheese wrapper, 1 kg | T.shs | 100 |
| Exchange rate to the Us Dollar | T.shs | 2200 |
| water/cubic meter (VAT incl.) | T.shs | 1400 |
| Electricity per kWh =kVA (VAT incl.) | T.shs | 360 |

| **Table 13-3 Pay roll expenses** | **Units** | **Monthly rate, T.Shs /unit** |
|---|---|---|
| **Manager** | 1 | 500,000 |
| **Plant operators** | 3 | 350,000 |
| **Milk collection centre operators** | 10 | 300,000 |
| **Marketing** | 2 | 350,000 |
| **Plant operators** | 3 | 300,000 |
| **Drivers** | 4 | 300,000 |
| **Casual labour** | 10 | 150,000 |
| **Security** | 14 | 250,000 |
| **Total** | 33 | |

### 3.6.8 Capital investments required

#### ***3.6.8.1*** *Buildings*

Table.14 shows the approximate area requirement for a 15,000LPD dairy plant. At an estimated cost of construction of 800,000 per square meter , the cost of the factory building including offices would be 188 million shs.

**Table 14: estimated cost of construction of a proposed new MMCL dairy plant in Simiyu**

| | Plant section | Approximate area (m2) | **total area ( $m^2$)** |
|---|---|---|---|
| 1 | Milk reception dock with single conveyor and weighing dump | 7 m x 10 m to 14 m = 78 $m^2$ | 98 |
| 2 | can washer | 5 m x 5 m (rotary can washer) or | 25 |
| 3 | Horizontal milk tank 10, 000 litrers | 3m x 5 m | 15 |
| 4 | Horizontal milk tank 5, 000 litrers | 2.5m x 3 m | 7.5 |
| 5 | Vertical product tank, 10,000 liters | 4 m x 4 m | 16 |
| 6 | Processing area | 5-6 times the area of equipment | |
| 8 | HTST pasteuriser, 2000/hr | | 20 |
| 9 | Space between equipment | 1.0 - 1.5 m | |
| 10 | Space between tanks | 1 m | |
| | **Area of 15,000 l/day plant** | | **181.5** |
| | Office space and utilities | **30% of plant size** | **54.5** |
| | Approximate area | | 236.0 |
| | Area of medium size plant (40,000 - 50,000) | | 300-400 |
| | Area of large scale plant (50,000 to 100,000 LPD) | | 400-600 |
| | **Cost of construction per $m^2$** | | **800,000** |
| | Total cost for 236 m2 | | 188,800,000.0 |

#### ***3.6.8.2*** *Milk collection centres and equipment*

There will be five milk collection centres. Constructing a new building with milk receiving platform (veranda) reception room, office, store, committee room (in case of farmers group MCC), toilets and a room for a generator may cost up to T.shs 80,000,000 (US$ 40,000) where necessary. The total capital investment for a 2000 litre/day MCC is about US$ 50,000 without the building while the running costs excluding labour, electricity will be about Tshs 4 million or US$ 2000 per annum. Hence the total capital investment for one MCC with new building will be Tshs 198 million and **990 million for the five MCCs.**

**Table.15 Capital investment for quality assurance at milk collection centers**

| Table 15: Capital investment for quality assurance at Milk collection centres (2000 litres/day; AV. 170 suppliers/M | | | | | | |
|---|---|---|---|---|---|---|
| Item | test | sub-items | Units | No of unts | Unit cost (T.Shs) | Total cost |
| Capita items for Milk co | Milk reception | Milk cooling tank | pcs | 1 | 52,000,000 | 52,000,000 |
| | | Standby Generator (28 KVA) | | 1 | 35,000,000 | 35,000,000 |
| | | Borehole | pcs | 1 | 10,000,000 | 10,000,000 |
| | | 5000 litre tank | pcs | 1 | 1,500,000 | 1,500,000 |
| | | Milk cans (50 litres) | pcs | 10 | 300,000 | 3,000,000 |
| | | Tray | pcs | 1 | 30,000 | 30,000 |
| | | Strainer | pcs | 2 | 50,000 | 100,000 |
| | | Alcohol gun | pcs | 1 | 100,000 | 100,000 |
| | % fat | Lactoscan | pcs | 1 | 5,250,000 | 5,250,000 |
| | % SNF | " | | | - | - |
| | %Added water | " | | | - | - |
| | Total capital investments (excluding building) | | | | | **106,980,000** |
| | | In US $ | | | | **50,943** |
| Milk reception milk tes | Alcohol test | | | | | |
| | | Alcohol 75% | litres | 75 | 14,160 | 1,062,000.0 |
| | | Glassware | pcs | 50 | 3,500 | 175,000.0 |
| | | Measuring cylinder | pcs | 5 | 25,000 | 125,000.0 |
| | | Measuring jugs | pcs | 3 | 20,000 | 60,000.0 |
| | | Spring balance | pcs | 2 | 150,000 | 300,000.0 |
| | Resazurin test | Resazurin Tablets | tins | 2 | 95,000 | 190,000.0 |
| | Lactometer tes | Lactometer | pcs | 5 | 50,000 | 250,000.0 |
| Cleaning and sanitizing | chemicals | Chlorinated Alkaline | 20 -litre | 10 | 112,250 | 1,122,500.0 |
| | | Antiseptic liquid det | 20-litres | 10 | 72,000 | 720,000.0 |
| **Total consumables for one year** | | | | | | **4,004,500** |

### *3.6.8.3 Raw milk and milk products transport vehicles and equipment*

There will be three milk transport tankers each with 5,000 liter capacity. Two refrigerated trucks each 4-5 tons for products will be required these are estimated to cost each 80,000 US$ tax inclusive. A total US $ 240,000 will be required for this purpose

### *3.6.8.4 Milk processing equipment*

The plant will manufacture liquid milk in the form of pasteurized milk, fermented milk in the form of yoghurt, and cultured milk (*mtindi*) as well as yoghurt, butter, ghee and cheese. The processing flow charts for the different products are shown in Fig.16-1 to 16-5.

**a) Fluid (pasteurized) milk processing**.

**Milk reception**

i) Milk will be received in the morning and evening in the ratio of 60:40
ii) A maximum of 15,000 x 0.6 = 9,000 litres will be received
iii) Milk will received for three hours from 8 AM -11 AM
iv) Milk reception per hr will be 9,000/3= 3000 liters/hr

Fig 16-1 is a process flow diagram illustrating how milk is handled at a dairy plant

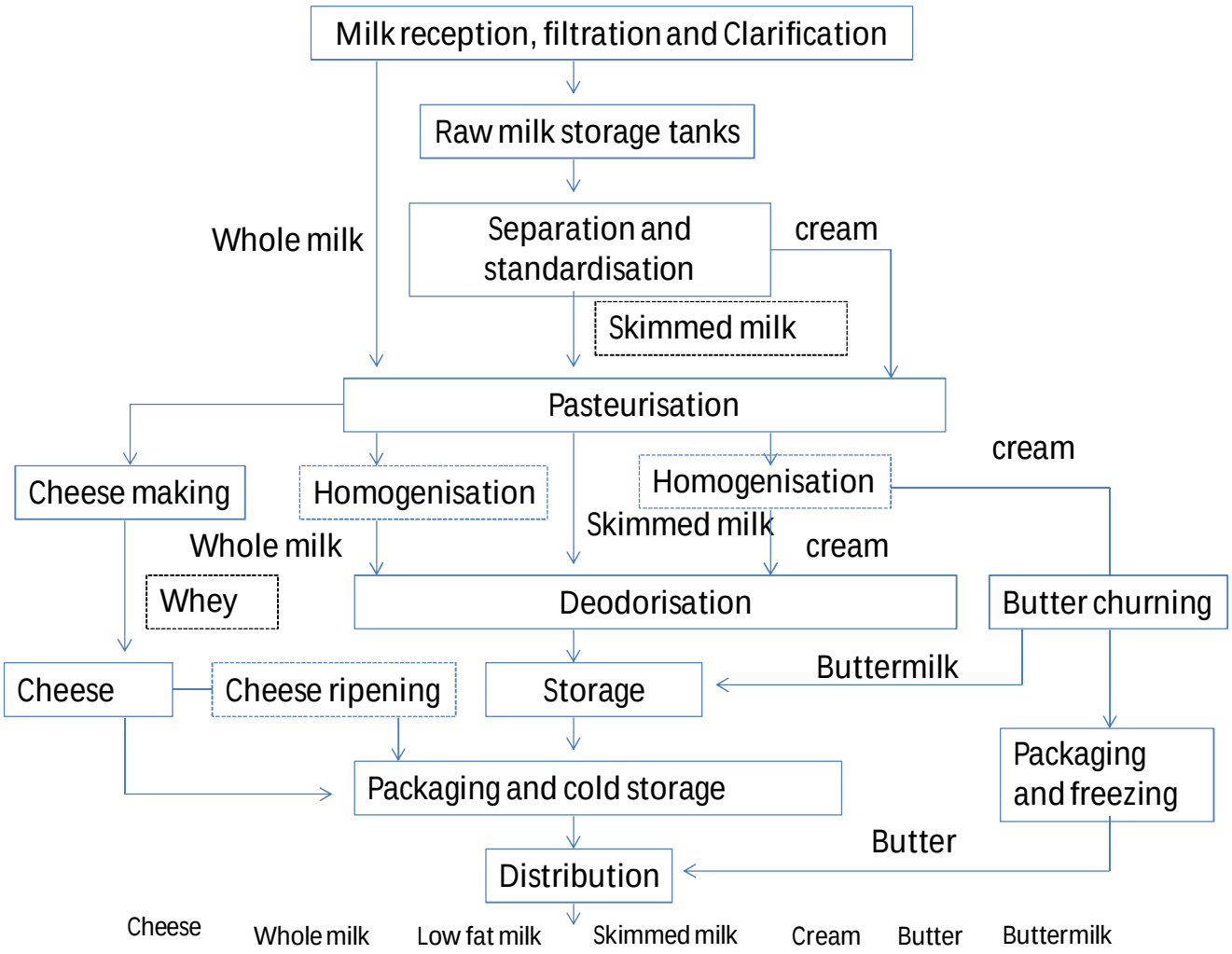


**Fig 16-1. Processes involved in a dairy plant producing pasteurized liquid milk as the main products plus other value added dairy products.**

### Fermented milk products

Production of fermented milk such as yoghurt or cultured milk follows the same processes and equipment except for the type of starter cultures used and incubation and product storage conditions. Yoghurt requires strictly maintenance of a cold chain while cultured (mtindi) may be handled at slightly warmer conditions as the fermentation is self arresting at about 1.2% titratable acidity (pH 3.8-3.7)

The general fermented milk processing procedure is shown in Fig 16-2

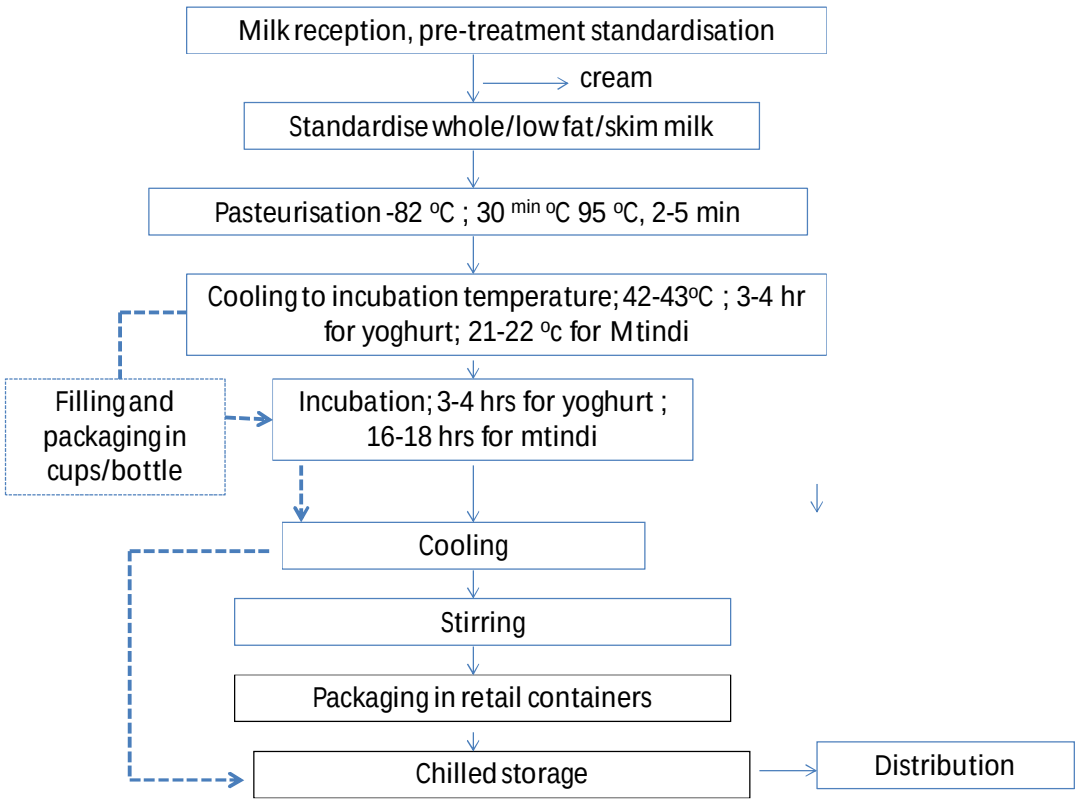



**Fig 16-2: Process for manufacture of fermented milk**

### Cheese

There are two types of cheese. Fresh or soft cheese and ripened hard or semi-hard cheese . Fresh cheese is packaged and distributed for consumption shortly after processing while ripened cheese is stored under special temperature and humidity conditions to allow fermentation by selected starter cultures to take place for a period ranging several weeks to several months. The text and appearance will differ according to the type of cheese there are over several hundred varieties of cheese. The commonest in Tanzania is the cooking cheese such as Mozzarella used in Pizas. Gouda cheese is also common among small scale processors in Arusha and Kilimanjaro regions.. The general cheese processing procedure is shown in Fig 16-3

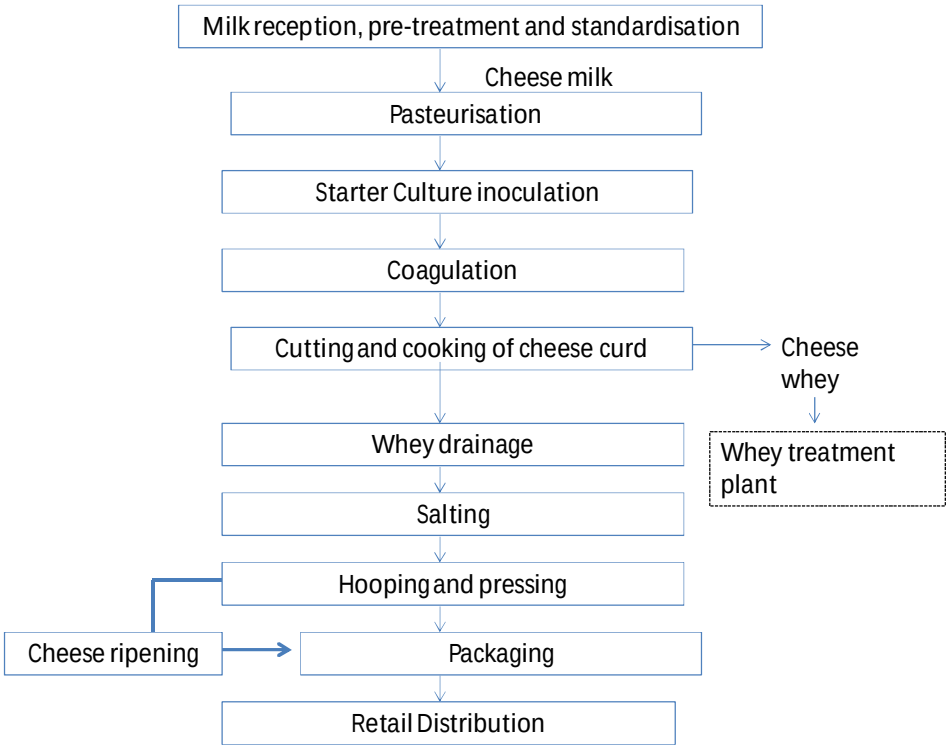



**Fig 16-3"Process for cheese manufacture**

## Butter

Butter processing involves the churning of 30%-40% BF cream obtained during pasteurization of milk after the 1st heat ion section of a plate heat exchanger at a temperature of 35-40 $^{o}$C. After churning and draining the buttermilk, the butter may be packed in bulk quantities of 25 kg for long period storage and then repacked into marketable portions of 250 g or 500g and in single service portions of 10-15 g for high end markets (hotels and airlines). The process flow is shown in Fig 16-4

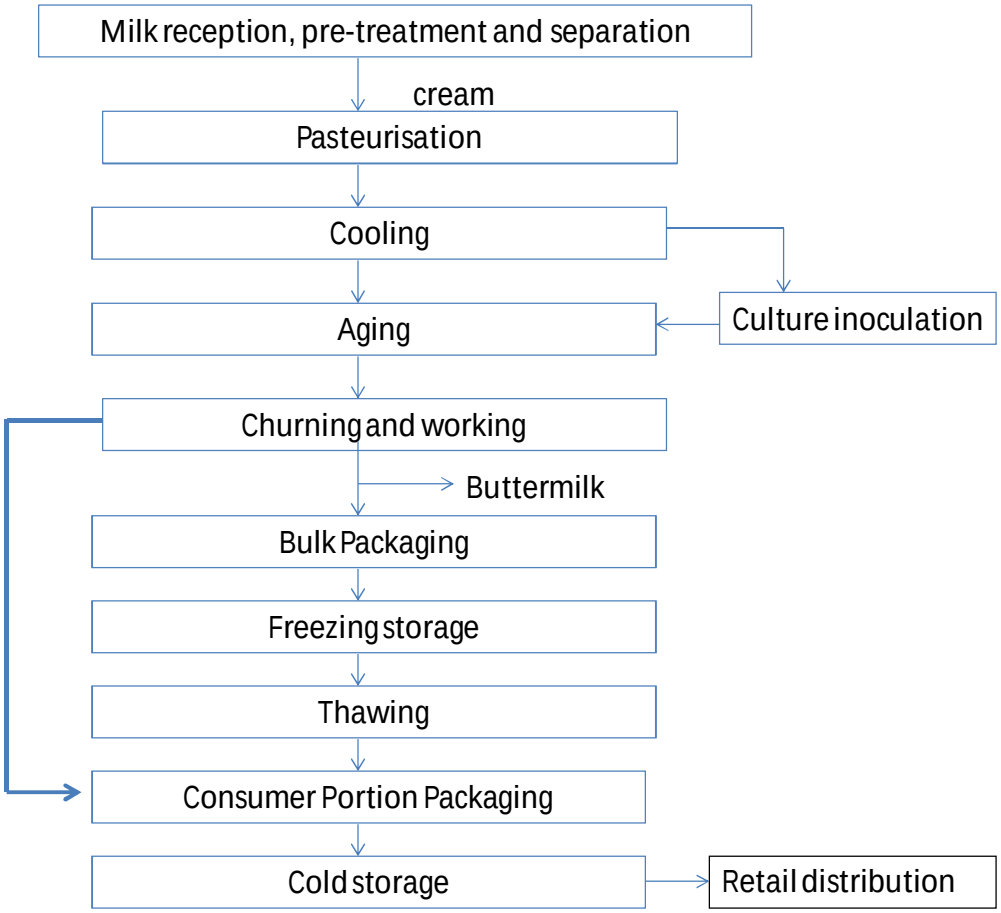



**Fig 16-4: Process for butter making**

### Ghee

Ghee processing is fairly simple involving heating of butter in a ghee pot until all the water has been evaporated at a temperature of about 125 $^{o}$C. The process flow is shown in Fig. 16-4

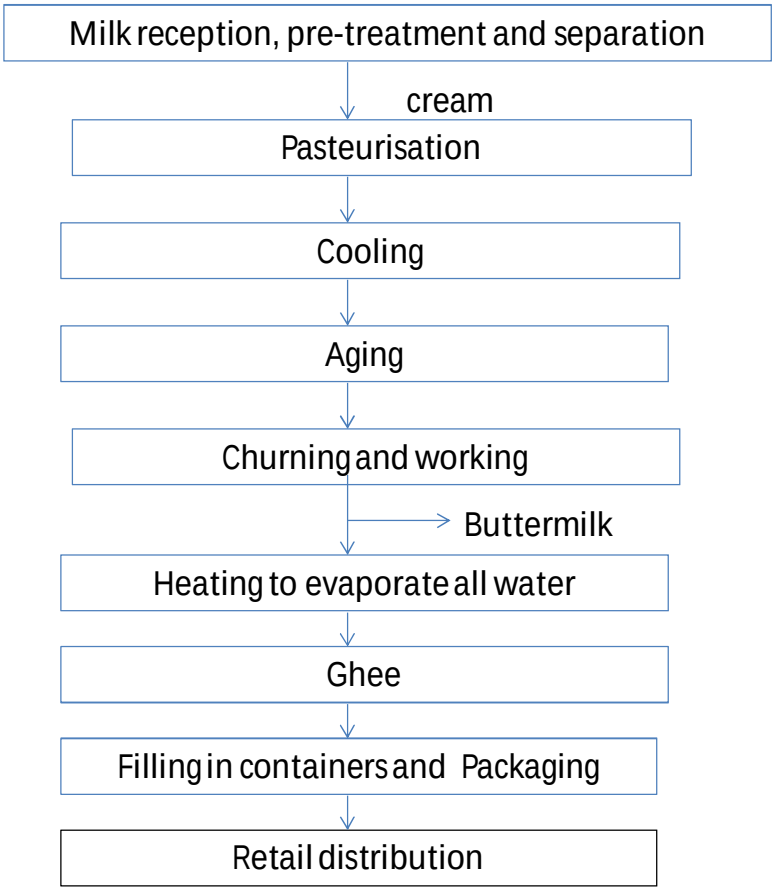



**Fig 16-5: Process for ghee processing**

### *3.6.8.5 Milk testing and quality control equipment*

MCCL will need to put in place a quality assurance system involving milk quality testing at the milk collection centres as well as at the dairy factory. Requirement for the MCCs has been covered above. At the factory in addition to the platform tests, there will be a Chemical and Microbiology laboratory equipped as shown in Table 17 below.

**Table 16 Equipping Chemical and Microbiology laboratories**

| Table xxx: MMCL dairy plant Laboratory Quality Control Facilities | | | | | | |
|---|---|---|---|---|---|---|
| Milk reception platf | Temperature | Digital thermometer | pcs | 2 | 12,000,000 | 24,000,000 |
| | Alcoho test | Alcoho gun | pcs | 2 | 60,000 | 120,000 |
| | | Alcohol 75% | litres | 30 | 14,160 | 424,800 |
| | Milk density | Lactometer | pcs | 30 | 50,000 | 1,500,000 |
| Laboratory tests | pH | pH meter | pcs | 1 | 1,500,000 | 1,500,000 |
| | % Fat; SNF | Lactoscan analyser | pcs | 1 | 5,250,000 | 5,250,000 |
| | Freezing point | Cryoscope | pcs | 1 | 31,500,000 | 31,500,000 |
| | Bacteriology | Rovibond comparato | pcs | 2 | 350,000 | 700,000 |
| | | Water bath | pcs | 2 | 1,500,000 | 3,000,000 |
| | Total Bacteria c | Incubator [a)] | | 3 | 750,000 | 2,250,000 |
| | | Petri dishes | pcs | 5000 | 500 | 2,500,000 |
| | Somatic Cell co | Automatic Somatic c | pcs | 2 | 14,700,000 | 29,400,000.0 |
| TOTAL | | | | | Tshs | **102,144,800** |
| | | | | | US $ | 48,640.38 |
| | Note: [a)] | 30 $^0$C, 37$^0$C, 45-50$^o$C | | | | |

## 3.6.9 Energy and water requirements

**Water**

Experience from other countries shows that water consumption in dairy processing plants varies detwee 2.21-9.44 m$^3$ per MT of milk processed in the 1970s. By using Cleaner production methods (CPM), European dairies have reduced the water consumption to 1.3 -2.5 m$^3$ per MT of milk processed by the 1990s. It is estimated that procesing one ton of milk at MMCL would require about 4 m$^3$ liters of water including heating refrigeration (ice water) cleaning and sanitation. Therefore at full capacity of production the MMCL plant will require 60 m$^3$ of water per day.

**Steam and hot water boilers and electricity.**

Approximately 80% of dairy plants energy needed is met by combustion of fossil fuels (coal, oil or gas) to generate steam and hot water for evaporative and heating processes. Electricity is required for running electric motors, cooling of milk, lighting and other activities in the dairy. The amount of energy needed will depend on volume of milk processed and type of products manufactured, efficiency of insulation of steam and hot and ice water pipes.

The proposed plant will use pasteurisation technologies which require heating of milk to temperatures not more 74- 80 $^o$C held at that temperature for several seconds. In the case of yoghurt and cream for butter manufacture , milk will be heated to 82 $^o$C

for 30 minutes or 90 $^{o}$C for 2-5 minutes and then cooled to 42-43 $^{o}$C and incubated at that temperature for 3-4 hours before it is cooled to less than 10 $^{o}$C..

Cheese processing will imnvolve pasteurisation at 72 $^{o}$C for 15 s followed by cooling to 35-41 $^{o}$C at which temperature cheese manufacture continues for 1.5-3 hrs depending on type of cheese, longer for Mozarrela or Cheddar type of cheese which involve leaving the curd to ferment until pH of around 5.2-5.3 for the curd to become strechable when cooked in hot water at 70-80 $^{o}$C. Hence a lot of heat energy is required. A fluid milk plant requires 0.25-0.4 kg of steam per liter of milk, while that of powder plant requires approx. 5 kg of steam per kg powder.

Generally, a typical mixed dairy products plant uses 0.5-1.2 MJ/kg of milk processed. The energy consumption for the proposed MMCL dairy plant has therefore been estimated at maximum of 18,000 MJ per day; 80% of which will be fossil fuel and 20% electricity. This implies a total of 5,040 kWh[10] or 5,040 kVA/day. Twenty percent **(1,008 kWh/day**) of the energy requirement will be in the form of electricity. Direct use of eletricity is needed for operation of conveyor belts, centrifuge, homogeniser, packaging, units drives and pumps, lights and refrigeration and air conditioning.

Table 17 shows the energy consumption for different processes in a dairy plant.

[10] 1MJ=0.28kWh

**Table 17 The energy consumption for different processes in a dairy plant.**

| Process | Energy consumption | | | | Total Energy |
|---|---|---|---|---|---|
| | Heat (steam) | | | Electrical | Kcal/100 kg milk |
| | Pressure (kg/cm$^2$) | Kg steam/ liter milk | Kcal/100 l milk | | |
| Can washing | | | | | |
| Rotary | 3.25 | 0.51 kg/can | 263 kcal/can | 13 kcal/can | 276 kcal/can |
| Straight | 4.2 | 0.43 kg/can | 221 kcal/can | 13 kcal/can | 234 kcal/can |
| Pasteurisation (90% heat recovery efficiency) | 3.0 | 0.012 | 750 | 103 | 853 |
| Separation | | | | 120 | 120 |
| Homogenisation | | | | 600 | 600 |
| Sterilisation | | | | | |
| Batch | 1.5 | 0.4 | 21300 | - | 21300 |
| Hydrostatic (continuous) | 1.5 | 0.12 | 6600 | | 6600 |
| Powder making (spraying process) | 14.0 | - | 23000 | 1790 | 24790 |
| Bottele washing | 3.5 | 1.3 kg/100 bottles | 668 Kcal/100 bottles | 95 kcal/100 bottle | 763 Kcal/100 bottle |
| Bottele filling | | | | 52 kcal/100 bottle | 52 kcal/100 bottle |

Source: Patel, S.M and A.G. Bhadania (Year?) AAU, Anand

### Refrigeration requirement

Refrigeration is required for chilling of milk and cold storage of dairy products such as butter. The ice water requirement is met by Ice Bank Tank (IBT). The ITB will run at night for 16-18 hrs preparing ice water to be used in manufacturing processes. Cold storage is required for dairy products such pasteurized milk, yoghurt, cheese, ice cream etc. Sizing of the refrigeration load should take into account the peak load. Refrigeration temperature range from -30 $^{o}$C to -40 $^{o}$C for ice cream to 1-4 $^{o}$C for liquid milk cooling,

### 3.6.10 Waste management and effluent disposal

Milk processing results in considerable amount of effluents from water used in cleaning , cleaning agents such as acids and detergents, and spillage of products and discharge of unwanted by-products such as whey. Discharge of dairy effluents into the environment can therefore cause undesirable pollution. Milk loss to the effluent can amount to 0.5-2.5% of the milk intake and can be as high as 3-4% if cleaner production (CP) methods are not adopted. Effluents from dairy plant contains a lot of organic matter and has there high Biological oxygen demand (BOD) and Chemical oxygen demand (COD). One litre of whole milk can contribute 110,000 mg $BOD_5$ or 210,000 mg of COD. Concentrations of COD in dairy effluents can vary from 180 -23,000 mg/L. High values occur when whey is discharged in the effluents instead of being utilized. A typical dairy effluent has 4000 mg/L of COD . This is the equivalent of 4% of milk solids received being lost in the effluent. Environmental authorities will therefore require dairy to have waste water treatment plants. This is an additional cost that must be taken into account.

The total equipment requirement and cost implications is tentative given in Table .18 below. They are based on a quotation from one reliable supplier in India who has successfully undertaken similar projects in African countries and elsewhere. (Appendix 3)

## Table 18 total equipment requirement and cost implications

| S/N | Milk collection Centre Equipment (3000 L/day) | | No of unit | cost/unit | Total cost US $ (Dollars) FOB Bombay** | |
|---|---|---|---|---|---|---|
| 1 | Milk Reception at MCC | Can tipping bar, digital weigh scale (300kg), Dump tank, Milk transfer pump (5 000l/h), milk inline filter, cooling tank 3000 litres, Sstank 200 litres, Sspiping and valves, Can scruber rotary type, Milk analysis | 5 | 26935 | 134,675 | 296,285,000 |
| | Standby generator | 28 kVA | 5 | 17,000 | 85,000 | 187,000,000 |
| | Borehole (water) | Borehole + 5000 water tank and pump | 5 | 6,000 | 30,000 | 66,000,000 |
| | Building | 100 m2 | 5 | 36,000 | 180,000 | 396,000,000 |
| 2 | Road milk tanker | without Chasis (truck chasis)** | 3 | 12427 | 37,281 | 82,018,200 |
| | | Truck chasis (5 tons) | 3 | 50,000 | 150,000 | 330,000,000 |
| | | Milk cans*** | 100 | 150 | 15,000 | 33,000,000 |
| 3 | Milk Reception at Milk processing factory | Can tipping bar, digital weigh scale (300kg), Dump tank-1000L, Raw milk chillerMilk transfer pump (5 000l/h), milk inline filter, cooling tank 3000 litres, Sstank 200 litres, Sspiping and valves, Can scruber rotary type, Milk analysis | 1 | 68937 | 68,937 | 151,661,400 |
| 4 | Milk processing section | | 1 | 114232 | 114,232 | 251,310,400 |
| 5 | Milk packaging equipment | | 2 | 28690 | 57,380 | 126,236,000 |
| 6 | Butter and ghee equipment | | 1 | 17708 | 17,708 | 38,957,600 |
| 7 | Fermented milk processing equipment | | 1 | 19417 | 19,417 | 42,717,400 |
| 8 | Drinking yoghurt equipment | | 1 | 114947 | 114,947 | 252,883,400 |
| 9 | Cheese vat | 500 litres | 1 | 10,097 | 10,097 | 22,213,400 |
| | Utilities | | | | - | - |
| 10 | Steam boiler | | 1 | 22523 | 22,523 | 49,550,600 |
| 11 | Compressed air | | 1 | 4971 | 4,971 | 10,936,200 |
| 12 | Chilled water | IBT system | 1 | 49707 | 49,707 | 109,355,400 |
| 13 | Electricals section | | 1 | 21747 | 21,747 | 47,843,400 |
| 14 | CIP Cleaning equipment | | 1 | 54717 | 54,717 | 120,377,400 |
| 15 | Standby generator | 500KVA | 1 | 85,000 | 85,000 | 187,000,000 |
| | Refrigerated truck | 7 ton truck for product distribution | 2 | 60,000 | 120,000 | 264,000,000 |
| | TOTAL | TOTAL Equipment and machinery | | | 1,393,339 | 3,065,345,800 |
| | | | | | | |
| | | Note: * with truck chasis = US Dollars 60,000 ? | | | | |
| | | ** CIF approx 3% of total FOB price | | | | |
| | | *** to be loaned to individual farmers and milk traders who bring milk to the MCC | | | | |

### 3.6.11 Organizational and legal feasibility

## 3.7 Legal structure of MMCL

Meatu Dairies Company Limited "Hereafter referred to MMCL is a company limited by shares owned by the MDC and Meatu Youth Enterprise "Hereafter referred to MYE". The shareholders with their share in bracket are Meatu District Council (95%) and MMCL (5%).

MYE is an aggregation of 84 youths from eight different business groups. They were syndicated by MDC to form a group of milk processors who then established a collaborative business company MMCL with MDC.

The company which was established in October 2016 with a total capital of TZS 44m (MDC contributed TZS 34m and MYE contributed TZS 10 m), is operating across various nodes of the dairy value chain, from sourcing through value addition to marketing. Currently, MMCL is producing and marketing fermented milk and yoghurt, with a projected capacity of about 800L, but the operational capacity is still below 400L. MMCL is employing seven youths and several day workers on the need basis.

The modus operandi of the company is based on the public private partnership format (PPP) and PPP Act of 2010, which describes the needs for the government institutions to make collaborative investments with private entities to capitalize on the many opportunities and foster employment and GDP growth.

.

The company is resident Mwanhuzi town, Meatu district. It is registered by the Business Registrations and Licensing Agency (BRELA) with the company registration No. 133446, and a certificate from Tanzania Food and Drug Authority (TFDA). MMCL is in the process of getting a certificate from Tanzania Bureau of Standards (TBS) to certify the standards and quality of the products (Total solids and fat content was found to be above the required standards).

Recently, the UNDP has injected TZS 11 million into the company from its youth empowerment program to enable MMCL to buy four cows, as a way of initiating backward integration.

In addition to the milk business, MMCL will in the future undertake other agriculture related businesses as a form of diversification as per Meatu Dairies Company Limited's Memorandum of Association.

**The Board of Directors**

The company will have a Board of Directrs, whose members will be recruited based on the *Taarifa ya Uanzishwaji wa Kampuni kwa Ajili ya Uendeshaji wa Viwanda katika Mamlaka za Serikali za Mitaa Mkoa wa Simiyu, 29 Mei 2017*.

The role of the Board will be to devise strategy, oversee good governance, oversee productive resources and costs of MMCL's activities so that the expenditures are within sustainable levels, reviewing monitoring and evaluation and re-adjustment, and stakeholder relations.

The Board will have between seven to nine members and will be reporting on the progress to the Annual General Meeting, and from time to time (bi-monthly) to the Council Management Team and to the Council's committee dealing with finance. Members of the board will be: Representatives of Meatu LGA District; Meatu Youth Enterprise representative; Lawyer (District Legal Officer) and professional/shadow directors depending on the need at a given point of the MMCL's growth cycle, e.g., from the Sokoine University of Agriculture, Research and Development organization (e.g. TALIRI), Tanzania Milk Processors Association (TAMPA), SIDO, TAMISEMI, Financial Institution, TCCIA, and TIRDO. The Managing Director will be the Secretary and will participate in the Board as non-voting member. Other experts may be invited to attend Board meetings from time to time to give professional advice, e.g. Tanzania Dairy Board, capabilities sourcing, investment, and marketing experts and analysts. The National Insurance Company will be a partner to the Board to advise them on operational, commercial, financial, and infrastructural risks.

The board would establish committees to support its activities in particular in key areas such as investment and resources mobilization, sourcing and marketing, finance and audit, competitiveness and risk management, and corporate governance.

## 3.8 Organization structure

After deliberations between MDC and MYE and the research team, it emerged that in order to successfully implement the expansion project, MMCL needs a re-organization and an updated staffing arrangements. The new MMCL organization chart for operations is presented below in Figure 16. MMCL will comprise of the following function and line units: Production and Product Development, Sourcing and Supplier Management, Information Technology, Communication and IMS, Operations and Finance, Human Resource Management, Legal, Procurement, and Internal Audit. At the initial phases, some of the line activities like Human Resource Management, Legal, Procurement, and Internal Audit may be out-contracted to reduce operational costs.

A refined organization structure and job descriptions, job flows, and compensation for the specific entities will be developed at a later stage by a commissioned HRM expert.

## 3.9 The management team

In addition to the Board, MMCL will have a senior management team that has skills and expertise in areas such as dairy business management, production operations of dairy

products, milk plant management, marketing, finance and administration, technology transfer, capability building, investment, and competitiveness dynamics of dairy products in Tanzania and East African countries.

The management of the factory will be at arm's length to mitigate reputational and political risks. MMCL is advised that in case they will have challenges with sourcing the requisite competences, they should think about a Special Purpose Vehicle to operate the plant while building the capacity of recruited human resources.

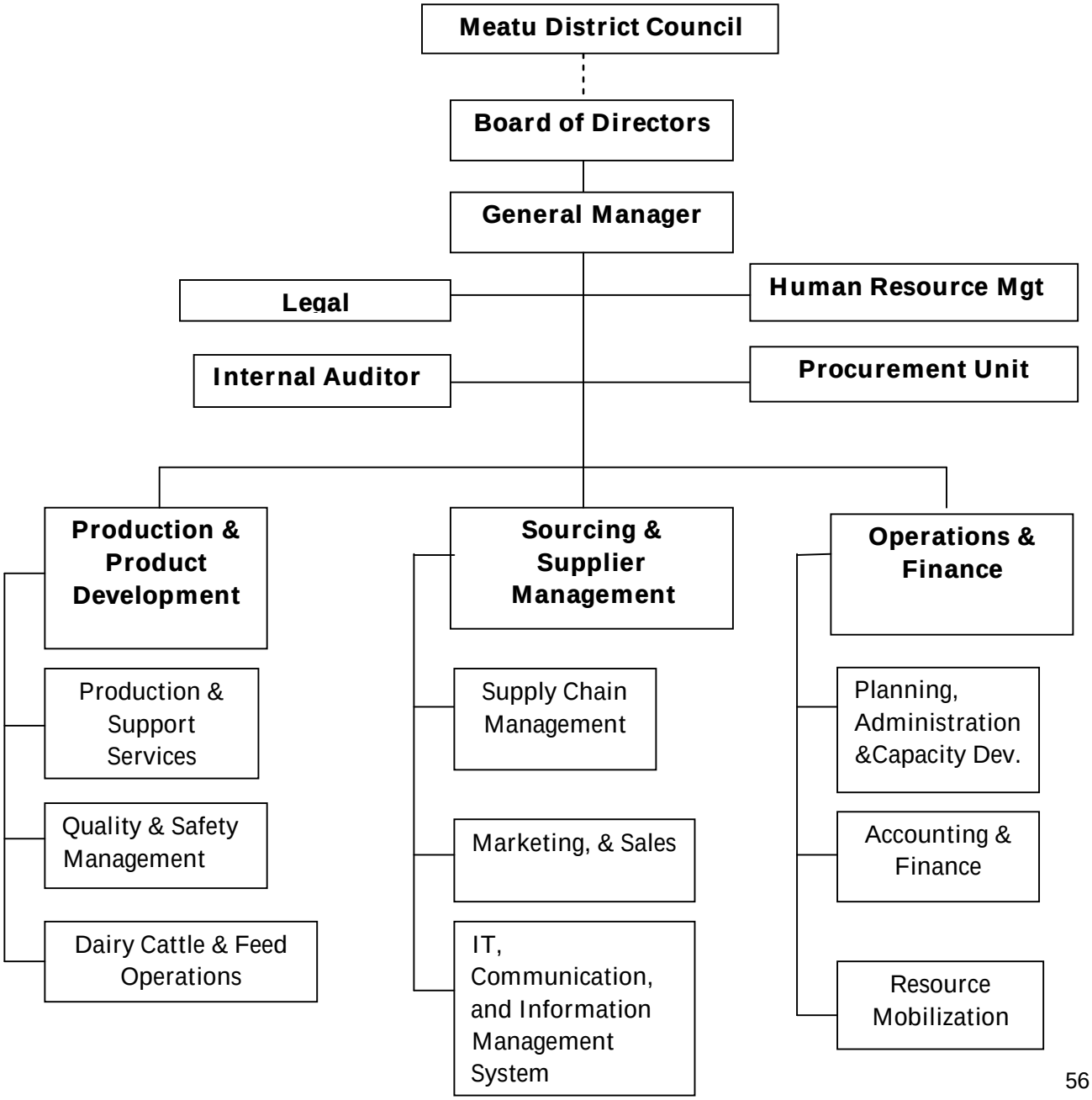


**Figure 16 Meatu Diaries Co. Ltd. Organizational Chart**

and tasks mentioned in the above sections and in the organizational chart in Figure 16. These will include personnel for undertaking the following functions: milk procurement, milk processing, products marketing, finance and accounting, IT and communication, and Information Management System (IMS). The quantities and skills sets that will be recruited will depend on the final strategic product choices that will be taken by the owners of MMCL, selected product lines, and start and survival phases and growth path considerations. This and the recruitment process will be determined by the MMCL owners and leadership in collaboration with the commissioned human resources management specialist.

## 3.11 Procedural, administrative, and institutional measures

### 3.11.1 Regulatory requirements and their cost implications

The expansion of MMCL may entail certification or compliance to the following:

*Tanzania Food and Drug Administration*

THE TANZANIA FOOD, DRUGS AND COSMETICS ACT (CAP 219) _____ REGULATIONS _____ (Made under Section 122(1) (i))

Registration for domestic food products-Milk and milk products USD 380
Inspection of new food processing facilities – large-TZS 250,000
Inspection of new food processing facilities –medium- TZS 200,000
Inspection of new food processing facilities –Small- TZS 100,000

Annual dealers permit for distributors-large scale- TZS 150,000
Annual dealers permit for distributors-medium scale- TZS 100,000
Annual dealers permit for distributors-small scale- TZS 50,000
More information may be accessed at

http://www.tfda.or.tz/index/sites/default/files/government%20notice%20gn%20464%20fees%20and%20charges%202015-1.pdf

*National Environmental management Council*

According to the ENVIRONMENTAL MANAGEMENT ACT, 2004 (Act No. 20 of 2004) and the ENVIRONMENTAL IMPACT ASSESSMENT AND AUDIT REGULATIONS, 2005, MMCL may have to comply to mandatory Environmental Impact Assessment:

Type A – Project requiring a mandatory EIA. Project is likely to have significant adverse environmental impacts and that in-depth study is required to determine the scale, extent and significance of the impacts and to identify appropriate mitigation measures.

(c) Type B – Project requiring Preliminary Environmental Assessment Project is likely to have some significant adverse environmental impacts but that the magnitude of the impacts are not well-known, a preliminary environmental assessment is required to decide whether the project can proceed without a full environmental impact assessment.
(d) More information on the scope and costs are available at:

http://www.nemc.or.tz/publication_categories/regulations

*Tanzania Bureau of Standards*
TBS charges clients for certification of products and processes, and quality management of inputs. The cost depends on the involved work.

*Tanzania Dairy Board*
The Tanzania Dairy Board charges its members annual contributions depending on the type of business. More information can be accessed at

http://www.tdb.go.tz/pages/tanzania-dairy-board

*Occupational Safety and Health Authority (OSHA)*
Occupational Health and Safety Act 2003. An annual fee needs to be paid based on the number of employees. A compliance license is issued to the occupier of a factory or workplace every twelve months upon fulfilling occupational health and safety requirements and upon payment of the prescribed fee.

***3.11.1.1*** *Other statutory fees and levies*

- A 30% Annual Corporate Tax, Income Tax Act,2004, Charge to tax to an individual who has total income in a year of income.
- A monthly 5% Skills and Development Levy, Levy paid on the gross pay of all payments made by the employer who has four or more employees, Tanzania Revenue Authority (TRA),
- Fire Certificate, Fire and Rescue Department, Fire and Rescue Force Act 2007, Based on the number of floors that a factory building has.
- Depending on type and size of business, Business License Category A – collected by National Government, Ministry of Industry Trade, and Investment(MITI);
- Annual fee for Business License Category B collected by local government, District Council, Depending on type and size of business and local authority

- Work Permits, Ministry of Home Affairs, The Immigration Act 1995, Fixed fee depending on class of permit Class A USD 3,050 (Investor), Class B USD 2,050 (employee). Fee charged upon application for the grant, issue or renewal of any permit, endorsement or pass.

## 3.12 Critical risks

### 3.12.1 Critical risks faced by the firm (currently or in the future).

- Policy and regulatory framework: there is wide agreement that the performance of the dairy industry in Tanzania has been long associated with a set of challenges, of which a hostile policy and regulatory environment ranks among the highest. Attention has been drawn to multiplicity, complexity and overlapping of regulations governing the industry which make both the cost of doing business, and the cost of the final product to the consumer, excessively high.
- Common External Tariff barriers and unregulated importation of cheaper milk products from external markets (especially from neighbouring countries, Kenya and Uganda) risk to suppress local initiative to increase dairy production and value addition through modern processing; Measures need to be taken to level the playing field
- The risk of disease outbreak, such a FMD, RVF, CBPP is constant and could decimate livestock herds and cause major loss for dairy producers and the dairy industry if contingent and prophylactic plans are not effectively and efficiently funded and implemented by national veterinary authorities;
- The effect of climate change would have significant impact on natural resources, in particular pasture and forage/crop production, affecting seasonal available grazing, and thereby reduce nutrition and consequently lactation levels of traditional and improved breed cattle.
- Milk production from the traditional herd is too low and very seasonal and cannot be relied upon to support the growth of the dairy industry in Tanzania. Two contrasting examples illustrate this situation very well. In Mara region there has been early investment in milk processing since 1960s without commensurate investment in dairy cattle production. Dairy plants there have continued to operate under capacity mainly because of a sparse milk production density. The Tanga Fresh and TDCU model offers a clear testimony of the need to approach dairy development holistically focusing on improved dairy cattle husbandry and building of strong grassroots farmers institutions. Short of investing in dairy cattle and establishing dairy farming in Simiyu the good intention may not bear the anticipated impacts.

- The PPP arrangement appears to be dominated by the local government (95%) shares rather that the youth. Past experience in operation of economic enterprises by public institutions need to be carefully considered.

### 3.13 Mitigation measures

- The Simiyu dairy project will need to invest in people through creating a reasonable number of dairy farmers over a period of about 10 years. The Tanga experience has taken more than 30 years to build. Hence installation of a processing plant has to consider introduction of dairy farming after careful considerations of the options proposed in the business plan. The institutional and the PPP arrangements will need to put the private sector in the driving seat of the joint venture. The independence of MMCL and the participation of dairy farmers in the ownership of MMCL need to be considered as a good way of ensuring loyalty of farmers to deliver milk to the factory under contract farming arrangements. Short of that sideselling of milk through the informal channels will continue to affect the flow of milk to the organized milk processing sector in Meatu.
-

## 3.14 Economic feasibility of expansion of Meatu Milk Company Ltd

### 3.14.1 SWOC Analysis

These are presented in Annex III which shows the strengths, weaknesses, opportunities and challenges that are expected to be encountered by the proposed project. Basically the strengths and opportunities of the plant emanate from the existence of a ready market in Tanzania and within the EAC and SADC regions. It is envisaged that given the quality of the milk produced coupled with the high demand for milk in the region and the low price entry strategy plus the support that the facility will get from the Government the MMCL's products will easily capture the Tanzanian market. The identified challenges can be mitigated by the strengths and opportunities of the proposed facility and they will not adversely jeopardize the viability of the project.

### 3.14.2 Major Assumptions

The major assumptions made in the preparation of this report are as follows:

- The sponsors of the project are committed to undertaking the investment and are ready to inject in the requisite capital.
- Given the envisaged price to be set and the quality of the product, and the support from the Government MMCL will eventually conquer at least 15% of the Tanzanian milk products market.

- The starting capacity utilization will be about 40% of the installed capacity. This level will be maintained increase annually at a rate of 5%.
- A standby generator to be bought will be a 500 KVA type costing about USD 100,000 including VAT and installation (Cost USD 85,000)
- The cost of production will be about 75% of sales
- Income from other sources (sale of by products) will be 5% of net sales starting in 2020.

### 3.14.3 Financial analysis

The initial investment for the proposed MMCL is estimated at TZS 4,400,000,000. This will be partially financed by a 6 year 15% loan from the NSSF (inclusive of a one year grace period) and equity to be provided by the project sponsors. The investment and financing requirements are shown in Table 19 below.

Table 19: Project initial costs and financing requirements

| Assets Summary | TZS | |
|---|---|---|
| Factory Buildings and Offices | **656,704,121** | |
| Milk Collection Centres | 116,822,160 | |
| Machinery and Equipment | 2,933,911,781 | |
| Modification of building | 33,652,557 | |
| Refrigerated Trucks - 3 @ USD 80,000 | 197,433,600 | |
| Furniture and Fixtures | 19,656,000 | |
| Environmental Costs | 50,000,000 | |
| Standby power generator - Cost and Installation | 245,700,000 | |
| Addition to Working Capital | 227,263,749 | |
| Motorcycles 3 | 10,920,000 | |
| 2OO Heifers @ 2,000,000 @5 yrs | **0** | |
| TOTAL | **4,492,063,968** | |
| Round Up | **4,400,000,000** | |
| Financing | | |
| Equity (MDC Contribution) | | |
| Amount Already committed | 0 | |
| Contribution in 2017 | 0 | |
| Expected New Contribution in 2017 | 2,900,000,000 | |
| **Total MDC Contribution** | **2,900,000,000** | |
| DEBT/LOAN | | |
| **NSSF Loan** | 1,500,000,000 | |
| Initial Capital Structure (2017) | | |
| Equity | **2,900,000,000** | **65.91%** |
| Debt | **1,500,000,000** | **34.09%** |
| TOTAL FINANCING | **4,400,000,000** | |

### 3.14.4 Financial Viability of the Proposed MMCL Project

The financial viability of the proposed MMCL Project was assessed through profitability, valuation metrics (i.e. the internal rate of return, the net present value, the payback period, and profitability index), cash flow position and overall financial position as represented by the balance sheet.

The profit trend is summarized in the Annex II Overall, under the normal assumed conditions, the project exhibits a positive and increasing profit after depreciation but before interest and taxes over the 15 years of analysis. Assuming normal conditions relative to prices of products and inputs and a cost of production of 70% the project will generate an IRR of 23.81% (against the 15% cost of capital), a positive NPV of TZS 1,588,843,252, a benefit-cost ratio of 1.35 and a payback period of 7 years as shown in table 20. All these metrics indicate that the project is financially viable and it will generate profits enough to pay off the NSSF debt within the requisite period of 6 years (inclusive of one year grace period) and generate retained earnings and dividends for the shareholders.

Table 20: Valuation Metrics (monetary figures in Tshs)

| METRIC | HORIZON | VALUE |
|---|---|---|
| Internal Rate of Return (IRR) | Finite (15yrs) | 23.81% |
| Net Present Value (NPV) at 15%[11] | Finite (15yrs) | TZS 1,588,843,252 |
| Profitability Index | Finite (15yrs) | 1.35 |
| Payback period (years) | | 7 Years |

The Annex summarizes the market's cash flows, the Financial Position (projected Balance Sheets) and the projected Profit and Loss accounts. All these show a healthy investment in terms of profitability and other measures of performance.

As shown in the Annexes, given the assumed production, sales, costs and expenses profits the facility will be profitable right from the outset. The project has the ability to generate profits right from the outset in 2018. Profits before taxes will range from a

[11] Although the bank of Tanzania has reduced the discounting factor from 16% to 12% since last year we are using 15% to discount the cash flows because this is the cost of the loan charged by the NSSF

minimum of TZS 1,384,544,420 in 2018 to a maximum of TZS 9,768,951,200 in 2032. Taxes will be paid throughout the assumed project duration and the facility will be able to pay the requisite annual interest and principal installments to NSSF. By the 2023 it will have serviced all its debt obligations to NSSF and starting in 2022, the facility will be able to pay its shareholders' dividends whereby the payout ratio will be about 50% of earnings.

### 3.14.5 Scenario Analysis

Appendix xxx shows the financial metrics assuming the most pessimistic scenario of prices falling by 10% from the predicted level, cost of production of 80% of expected sales and expenses rising by 15%. With this scenario the project still remains profitable as table 21 shows in terms of sales revenue and profitability of the project for the first five years.

Table 21: Project Revenue and Profitability for the first 5 years under pessimistic assumptions

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| **INCOME** | | | | | |
| Net Sales | 7,268,263,002 | 11,703,141,000 | 12,871,591,047 | 13,515,170,600 | 14,190,929,130 |
| **Total Revenue** | **7,268,263,002** | **11,703,141,000** | **12,871,591,047** | **13,515,170,600** | **14,190,929,130** |
| Cost of Production | 5,814,610,402 | 9,362,512,800 | 10,297,272,838 | 10,812,136,480 | 11,352,743,304 |
| Gross Profit | 1,453,652,60 | 2,340,628,200 | 2,574,318,209 | 2,703,034,120 | 2,838,185,826 |
| | | | | | |
| **EXPENDITURE** | | | | | |
| Salaries (FT Staff) | 81,000,000 | 100,602,000 | 108,650,160 | 117,342,173 | 126,729,547 |
| Casual Labour | 16,200,000 | 20,120,400 | 21,730,032 | 23,468,435 | 25,345,909 |
| Water and Sewerage | 672,000,000 | 834,624,000 | 901,393,920 | 973,505,434 | 1,051,385,868 |
| Communication expenses | 6,000,000 | 7,452,000 | 8,048,160 | 8,692,013 | 9,387,374 |
| Repairs and maintenance | 3,000,000 | 3,726,000 | 4,024,080 | 4,346,006 | 4,693,687 |
| Cleanliness | 1,200,000 | 1,490,400 | 1,609,632 | 1,738,403 | 1,877,475 |
| Stationeries, uniforms and other supplies | 1,200,000 | 1,490,400 | 1,609,632 | 1,738,403 | 1,877,475 |
| Marketing Expenses | 24,000,000 | 29,808,000 | 32,192,640 | 34,768,051 | 37,549,495 |
| 2 Trucks Running Costs (200ltrs@2400/=*30) | 172,800,000 | 214,617,600 | 231,787,008 | 250,329,969 | 270,356,366 |
| Generator Running Costs (10 ltrs@2400/=*30) | 8,640,000 | 10,730,880 | 11,589,350 | 12,516,498 | 13,517,818 |
| Oversight Costs (Board Meetings) | 37,400,000 | 46,450,800 | 50,166,864 | 54,180,213 | 58,514,630 |
| Insurance Premium (building 0.5%) | 4,925,281 | 5,319,303 | 5,744,848 | 6,204,435 | 6,700,790 |
| Insurance Premium (Truck 3%) | 5,923,008 | 6,396,849 | 6,908,597 | 7,461,284 | 8,058,187 |
| Other Admin. Expenses | 1,200,000 | 1,296,000 | 1,399,680 | 1,511,654 | 1,632,587 |
| **Total Expenditure** | ***1,035,488,289*** | ***1,284,124,632*** | ***1,386,854,603*** | ***1,497,802,971*** | ***1,617,627,208*** |
| | | | | | |
| ***Profit before Depreciation & Interest Charge*** | ***418,164,311*** | ***1,056,503,568*** | ***1,187,463,607*** | ***1,205,231,149*** | ***1,220,558,617*** |
| Depreciation **(Annex 1)** | (227,721,625) | (227,721,625) | (227,721,625) | (227,721,625) | (228,363,225) |
| | | | | | |
| Loan Interest Charges | 225,000,000 | 225,000,000 | 199,296,696 | 169,737,896 | 135,745,277 |
| **Profit/Loss Before Tax** | **415,442,687** | **1,053,781,943** | **1,159,038,678** | **1,147,247,421** | **1,127,940,670** |
| Corporate Tax - 30% | (124,632,806) | (316,134,583) | (347,711,603) | (344,174,226) | (338,382,201) |
| **Profit/Loss After Tax** | **290,809,881** | **737,647,360** | **811,327,075** | **803,073,195** | **789,558,469** |
| Dividends - 50% | 0 | 0 | 0 | 0 | (394,779,234) |
| Retained Earnings | 290,809,881 | 737,647,360 | 811,327,075 | 803,073,195 | 394,779,234 |
| **Accumulated Retained Earnings** | **515,809,880** | **1,253,457,240** | **2,064,784,315** | **2,867,857,509** | **3,262,636,743** |

With the above assumptions the IRR, NPV and Payback periods will be as shown in table xxx below. The IRR will be 18.74% (against the cost of capital of 15%). The NPV will be TZS 746,146,093, the benefit-cost ratio will be 2.86 and the payback period will be 9 years as shown in table 22.

Table 22: Valuation Metrics (monetary figures in Tshs)

| Metric | HORIZON – 15 Yrs |
|---|---|
| Internal Rate of Return (IRR) | 18.74% |
| Net Present Value (NPV) at 15% | TZS 746,146,093 |
| Profitability Index | 1.17 |
| Payback period (years) | 9 Years |

The above investment scenario can, however, change if the project injects in a further TZS 2 billion to purchase at least 200 heifers/yr for 5 years to ensure a reliable supply of milk. In this case the requisite initial investment will be TZS 6,700,000,000. Crossbred heifers can be introduced at rate of 200, 300 or 400 per year over 5 years assuming a calving rate of introduced heifers at 95% and subsequent calving rate of 60%,. Survival to first calving equals 70% 4 and ages at 1st calving equal to three years. The financing arrangements will change with the Meatu District Council required to raise about 77.6% of the requisite capital and the loan from NSSF comprising the balance 22.4%. Such additional capital investment may take the form of social capital grants from a regional dairy development project.

Table 23; The most Pessimistic Scenario involving introduction of dairy farming in Meatu

| Assets Summary | | | |
|---|---|---|---|
| Factory Buildings and Offices | | **656,704,121** | |
| Milk Collection Centres | | 116,822,160 | |
| Machinery and Equipment | | 2,933,911,781 | |
| Modification of building | | 33,652,557 | |
| Refrigerated Trucks - 3 @ USD 80,000 | | 197,433,600 | |
| Furniture and Fixtures | | 19,656,000 | |
| Environmental Costs | | 50,000,000 | |
| Standby power generator - Cost and Installation | | 245,700,000 | |
| Addition to Working Capital | | 227,263,749 | |
| 3 Motorcycles | | 10,920,000 | |
| 200 Heifers | | 2,184,000,000 | |
| | | **6,676,063,968** | |
| | | **6,700,000,000** | |
| Financing | | | |
| Equity (MDC Contribution) | | | |
| Amount Already committed | | 0 | |
| Contribution in 2017 | | 0 | |
| Expected New Contribution in 2017 | | 5,200,000,000 | |
| Total MDC Contribution | | **5,200,000,000** | |
| DEBT/LOAN | | | |
| NSSF Loan | 1,500,000,000 | | |
| | | | |
| Initial Capital Structure (2017) | | | |
| Equity | | **5,200,000,000** | **77.61%** |
| Debt | | **1,500,000,000** | **22.39%** |
| TOTAL FINANCING | | **6,700,000,000** | |

In this case the project will not be viable as table 11 below shows whereby the NPV of the project will be negative, the IRR well below the cost of capital of 15% and the benefit-cost ratio below 1.0

Table 24; Financial ratios for the most pessimistic scenario

| Metric | HORIZON – 15 Yrs |
|---|---|
| Internal Rate of Return (IRR) | 9.61%% |
| Net Present Value (NPV) at 15% | TZS (1,437,853,907) |
| Profitability Index | 0.78 |

### 3.14.6 Margin of Safety

This shows the amount by which sales can drop before a loss will be incurred. With the targeted initial capacity utilization of 50% units the facility can afford to incur a cost of production of 80%, decrease the capacity utilization to 30% and prices decreasing by 30% before it incurs any catastrophic consequences. This indicates a commercial viability of the project because under normal circumstances it is not envisaged that sales will reach a point whereby it will have to fall by up to 60%.

### 3.14.7 Commercial viability

The commercial viability of the project is hinged on the assumption that there is a market for the product such that at the beginning the plant will utilize its capacity at no less than 40%. Given the market analysis, this level will be easily surpassed. Also it is assumed that the cost of production will not exceed 75% of sales. This implies that the lowest gross profit margin to be acquired is 25%. Below that level the project will not be viable although the NPV will still be positive and the IRR above the cost of capital. As an entry strategy, it is recommended that without compromising on the quality the gate prices for all the products be below those of major competitors ASAS and Tanga fresh.

The project will be able to repay the NSSF loan (at 15% interest) within 8 years having enjoyed a grace period of 2 years. At the outset, the financing of the project will be 100% debt (NSSF loan). The NSSF stake will continue decreasing as the loan is repaid and the equity stake of the MDC and MYE group grows.

It is noteworthy that all the above analyses have been made assuming that the construction part of the project will only be in phase one. As the project grows and income is generated, initially at least 50% of the earnings should be retained to increase the capacity and physical appearance of the plant. Also, part of the earnings should be used to increase manpower capacity and motivation in terms of training and remuneration to the workers.

# 4 Conclusions, Recommendations and follow-up actions

1. The analyses have clearly shown that there exists a potential, albeit smaller than originally thought, to develop the milk value chain in Meatu district to include a mid size milk processing plant of the order of 15,000 litres per day. The economic analysis is grounded on the assumption that in addition to the five top locations identified in Meatu district, pockets of surplus milk can be identified in other districts of Simiyu region where milk collection centres can be profitably located.
2. To avoid the pitfall of especially the demonstrated strong seasonality of milk supply from the traditional cattle herd, the analysis shows that introduction of dairy cattle farming at the rate of 200 to 400 heifers per year for a period of at least five years will provide a firm ground for sustainability of the dairy industry to thrive in Meatu district specifically and Meatu region in general.
3. From the destop and field research and consultation with the owners and other stakeholders it is proposed that MMCL expand and diversifies its product portifolio from yoghurt only to include pasteuirised milk cup yoghurt (plain and flavoured;), Mtindi (plain and sweetened;), cheese mozallela), butter and ghee. UHT and powder should be considred in the longterm when MMCL is able to collect more than 100,000 L per day.
4. There is a need for a total revamp of processing facilities including development of industrial land (19,275 sq. meters) in Mwanhuzi, costruction of the plant/factory shell, and purchasing new machinery, processing and packaging facilities. The total cost is estimated at 4.4 billion shs of which 1.5 billion would be borrowed capital from NSSF

5. In terms of marketing, MMCL should focus on the Lake zone market and after consolidation move east and southward Tanzania. Introduction of school feeding will further consolidste the market for milk and milk products.
6. For sustainability and risk management purposes, the expanded MMCL should establish a backward linkage related to milk production with the following options to choose from:
   a. To address seasonality in the supply of raw milk, procure and raise own 300-500 dairy cattle with high genetic potential to ensure a consistent basic supply, particularly during the dry season;
   b. Train selected interested and committed 4,000 entrepreneurs/dairy farmers, farmer groups/*vikundi* (*kuanzishwa vikundi viwili vya wazalishaji maziwa 15 kila kimoja kwenye kila kijiji moja; jumla vikundi 260 vya kuzalisha maziwa kwenye Kata 15 za Halimashauri ya Meatu.*

c. *The proposed milk collection centres should be located in villeges with the highest concentration of cattle as identified in the report.*

d. To increase and sustain milk supply all ear around, MMCL is supposed to facilitate and train entrepreneurs to establish milk cooperatives/associations, collection points and centers in Meatu District and other neighboring districts, such as Bariadi DC, Itilima, and Maswa District
e. MMCL should facilitate its suppliers (contracted individuals, enterprises, women groups, cooperatives/associations, producer organization with dairy cattle credits, and capacity building dairy framing and farmer group management

7. To be competitive, MMCL should mobilize additional adequate, low cost funding (prefarably below 10% interest or grants ) to buy all facilities required to handle milk and milk products, and to process and distribute them, including a cold storage and transportation fleet with refrigeration capacity. The financial analysis has shown that the allocated TZS 1.5 billion will not be adequate to implement all this. Additional financing should be mobilized.
8. To ensure a sustainable market for the processed milk, MMCL should consider introduction of school milk feeding in the Meatu district. This will bring nutritional and health benefits to the pupils and ensure economic prosperity of the rural communities.

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# 6 Persons met

| S/N | Name | Affiliation/Position | Contacts |
|---|---|---|---|
| 1. | Mr. Manoza Fabian | DEO | manozafabian@yahoo.com; 0622404712 |
| 2. | Magai M. Magai | HR Officer | mmassubnd@gmail.com; 0683518909 |
| 3. | Hossein Nyenye | Ag. DLFDO | nyenyehussein@yahoo.com; 7527479947 |
| 4. | Revocatus Meney | DGO | revoomen@gmail.com; 0713772609 |
| 5. | Pamba Hezron | Ag. LEO | pambahezron@gmail.com;0763281804 |
| 6. | Sara John | SWO | sajohny@yahoo.co.uk; 0755052520 |
| 7. | Rose P. Kinyamasongo | Ag. DLNRO | rkinyama@gmail.com;0719968932 |
| 8. | Kisinza J. Kisinza | DYO | kisinzajoseph@gmail.com;0 767830100 |
| 9. | Rajab Mbua | PSSN | Mbuar2008@gmail.com; 0757424717 |
| 10. | Lenzako K. Msabaha | Economist | lenzakomsh@gmail.com; 0754819942 |
| 11. | Rogatevane Kipigapasi | PLO | roogykipper@gmail.com; 0627363969 |
| 12. | Said Kisamba | Ag. LO | skisamba@gmail.com;0784888150 |
| 13. | Bogias B. Ntamwana | Ag.DSEO | borgiasnb@gmail.com; 0756452166 |
| 14. | Gervas D. Dmata | SAPOI | gervassamata@gmail.com;0754016881 |
| 15. | Sayi Masanja | | sayimasanja26@gmail.com;0762640526 |
| 16. | Reuben B. Malimi | | malimireuben@yahoo.com;0784627003 |
| 17. | Gerald J. Baruti | SAFOI | barutig@yahoo.co,' 0768220206 |
| 18. | Deodatus P. Mganga | Ag DAICO | dsoloka@gmail.com; 0713808780 |
| 19. | Dr Assey John | DMO | sixtjo@yahoo.com; 0769396806 |
| 20. | Engineer Mussa Miraji | | Mussamiraji7@gmail.com;0766583227 |
| 21. | Mwl. John Mpamwa | | Mpamwa3@gmail.com;0763572715 |
| 22. | Paulo Mwabusila | | pmwabusila@yahoo.com; 0756777781 |
| 23. | Rashid S. Pupwa | Afisa maendeleo | rpupwa@gmail.com; 0763907888 |
| 24. | Ibrahim J. Mponzi | | imponzi@gmail.com; 0756488610 |
| 25. | Bernard M.Francis | | bernardmarco@gmail.com; 0686876565 |
| 26. | Vicent Mapalala | | vicemap@gmail.com; 07622326992 |
| 27. | Romanus Thomas | | Romatho.rt@gmail.com; 0712035204 |
| 28 | Kasika M. Mujuberi | | mujuberikasika@gmail.com; 0756440740 |
| 29. | Hamida N. Mbwana | | mbwanahamida@gmail.com; 0753307410 |
| 30. | Zuwena A. Malley | Lishe | abbyzunny@yahoo.com;0784978115 |
| 31. | Upendo Naftali | DCDO | pendonaftali@gmail.com; 0765735930 |
| 32. | Samson Mugasha | Ag. DIA | mugashasamson@yahoo.com; 0714129190 |
| 33. | Eng. Cjarles Muyenjwa | MD | muyenjwach@gmail.com |
| 34. | Rehema T. Yangayanja | DPSO | Rehema.rehematito3@yahoo.com |
| 35.. | Malongo M. Jackson | CC | Mallongojackson52@gmail.com; 0787309328 |
| 36. | James Dalasia | Ag. AT | jamesbalasia@yahoo.com; 0763223372 |
| Farmers, Livestock keepers and WEO and VEOs from Bukundi Village, Mwanjolo Ward | | | |
| 37. | Specios Alex | | |
| 38. | Samson Lugembe | | |
| 39. | John Enos | | |

| | | | |
|---|---|---|---|
| 40 | Christian Dagala | | |
| 41. | Flora Balole | | |
| 42. | Vicent Simon | | |
| 43. | Kenedy Ualindi | | |
| 44. | Elias Ibamba | | |
| 45. | Stephano Lukunyika | | |
| 46. | Mkeshi Mhoja | | |
| 47. | Ndalahwa Lukindika | | |
| 48. | Hanusi Ipagala | | |
| 49. | Ramadhani Lucas | | |
| 50. | Timothy Mayala | | |
| 51. | Joseph Kulola | | |
| 52. | Joseph Ngw'inula | | |
| 53. | Mashauri Donard | | |
| 54. | Mashima Elias | | |
| 55. | Amos Mwingila | | |
| Wamiliki na wauzaji maduka pamoja na bidhaa za maziwa, Muhanuzi, Meatu | | | |
| 56. | Idrisa Shabani Kassongo | | |
| 57. | Kapinga S. Shija | | |
| 58. | Richard M. Challya | | |
| 59. | Mwahanus M. Said | | |
| 60. | Pius S. Machege | | |
| 61. | Peterson Msobozi Emmanuel | | |
| 62. | Sadick C. Masungu | | |
| 63. | James K. Benedict | | |
| 64. | Ngw'ashi M. Nkilijiwa | | |
| 65. | Michael Kisangi | | |
| 66. | Anthony Luyeye Muhana | | |
| 67. | Malkia M. Macele | | |
| 68. | Ester Nabigambo | | |

# 7 Appendices

## 7.1 Annex I :Terms of Reference

**The team of three consultants were tasked with carrying out** a feasibility study and produce a report with the following information:

- Preliminary Analysis and Technical feasibility
  - Assessing technology and equipment required and expected costs based on current prices provided by at least three dairy processing machines suppliers on a Turnkey basis.

- Market feasibility
  - Debriefing and Assignment Orientation – Document Review and stakeholders identification and communication to examine relevant reports on (product/ service e.g. milk) business including production, import, export volumes; distribution networks and immediate projects; sources include Local Government/Authorities, TANTRADE, TRA and TCCIA.
  - Conducting Internal Assessment – To Study the projects internal and external operating Framework including Legal and Policy documents; to identify capacity, strengths and limitations on project promoters/stakeholders and identify project implementation and organizational needs.
  - Conducting External Assessment – conduct field work to assess product needs and current supply; respondents and sources include major producers, distributors, agents, dealers of the same or similar products and support service providers (banks, utilities – telecommunication/power/water, media/advertisement).
- Conducting External Assessment - carry out interviews with major customers of the product/ services or similar product/ services and facilities including industries, wholesalers, business community, education institutions & other big institutions, supermarkets, exporters & importers, and individuals. Interview with all key players and regulators such as TFDA, TBS, NEMC, OSHA etc
- Overall Risk Assessment (contingency plan)
- Organization and managerial feasibility
- Legal feasibility
- P & B -Review and analysis of data for final conclusion or investment decision making
- Assess and propose improvement of the business model for MMCL

1. **Specific Tasks to be performed by the consultant (Business Planning, Management and Financing)**

Develop a Business (Commercial) feasibility that's highlighting the following

- Calculating financial costs
- Determining resources required to implement the business idea
- Payback analysis (Break Even Analysis)
- Return on Investment analysis
- Financial Risk
- Financial cost of failure (worst case scenario analysis)
- Identifying sources of Resources
- Realistic benefit analysis

The develop a business plan that includes but not limited to the following;

- Products/services; Validation of problem and solution, future plans etc
- Market analysis; Segmentation, needs, trends, competition, customers etc –
- Strategy and implementation; market plans, sales plans, technology, equipment, tools etc
- Organization and management team; organization structure, management team, personnel, ownership etc
- Financial plan and projections; Forecast, expenses, projected profit and loss, projected balance sheet analysis etc
- P&MB Executive summary; Problem, solution, market, completion etc

**3. Deliverables are**

- Inception Report
- Data Collection Tools
- Draft Report
- Stakeholders Workshop Proceedings
- Final Feasibility Study and Business Plan Report

## 7.2 Appendix II: Financial Projections

**MEATU DICTRICT COUNCIL**
**PROJECTED CASH FLOW STATEMENTS**

6%

| ITEM | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 |
| **CASH INFLOW** | | | | | | | | | | | |
| ***Profit before Depreciation & Interest Charge*** | | 1,387,266,045 | 1,419,225,391 | 1,412,627,023 | 2,037,300,786 | 2,048,558,449 | 2,053,062,226 | 2,049,889,080 | 2,038,022,995 | 2,016,346,584 | 1,983,631,967 |
| | | | | | | | | | | | |
| MDC Contribution/Equity | 2,900,000,000 | | | | | | | | | | |
| NSSF Loan | 1,500,000,000 | | | | | | | | | | |
| **Total Inflow** | **4,400,000,000** | **1,387,266,045** | **1,419,225,391** | **1,412,627,023** | **2,037,300,786** | **2,048,558,449** | **2,053,062,226** | **2,049,889,080** | **2,038,022,995** | **2,016,346,584** | **1,983,631,967** |
| | | | | | | | | | | | |
| **CASH OUTFLOW** | | | | | | | | | | | |
| Loan Facilitation fees | 0 | | | | | | | | | | |
| Cap Exp: Building and other civil works | (656,704,121) | | | | | | | | | | |
| Cap Exp: New Motor Trucks | (197,433,600) | | | | | (200,000,000) | | | | | (300,000,000) |
| Cap Exp: Standby Generator | (245,700,000) | | | | | | | | | | |
| Cap Exp: New Furniture | (19,656,000) | | | | | | (80,000,000) | | | | |
| Cap Exp: Milk Processing Machines | (33,652,557) | | | | | | (1,099,098,000) | | | | |
| Environmental Costs | (50,000,000) | | | | | | | | | | |
| Increase in W/capital | (227,263,749) | | | | | | | | | | |
| Corporate Tax | | (331,762,945) | (148,996,326) | (167,929,023) | (379,380,191) | (407,698,886) | (524,677,633) | (571,402,565) | (675,936,901) | (786,490,919) | (919,769,271) |
| | | | | | | | | | | | |
| **Total Cash Outflows** | **(1,430,410,027)** | **(331,762,945)** | **(148,996,326)** | **(167,929,023)** | **(379,380,191)** | **(607,698,886)** | **(1,703,775,633)** | **(571,402,565)** | **(675,936,901)** | **(786,490,919)** | **(1,219,769,271)** |
| | | | | | | | | | | | |
| **Net Cashflows before Finance Servicing** | **2,969,589,973** | **1,055,503,100** | **1,270,229,065** | **1,244,698,000** | **1,657,920,594** | **1,440,859,563** | **349,286,593** | **1,478,486,515** | **1,362,086,094** | **1,229,855,665** | **763,862,696** |
| | | | | | | | | | | | |
| **Financing Related Cash outflows** | | | | | | | | | | | |
| Interest Payment | (610,200,000) | (610,200,000) | (610,200,000) | (540,492,640) | (460,329,175) | (368,141,191) | (262,125,009) | (140,206,400) | 0 | 0 | 0 |
| Bank Loan Repayment - Principal | | | (464,715,736) | (534,423,096) | (614,586,561) | (706,774,545) | (812,790,727) | (934,709,336) | 0 | 0 | 0 |
| | | | | | | | | | | | |
| **Total Debt Servicing** | **(610,200,000)** | **(610,200,000)** | **(1,074,915,736)** | **(1,074,915,736)** | **(1,074,915,736)** | **(1,074,915,736)** | **(1,074,915,736)** | **(1,074,915,736)** | **0** | **0** | **0** |
| **Net Change in Cash before Dividend** | **2,359,389,973** | **445,303,100** | **195,313,329** | **169,782,264** | **583,004,858** | **365,943,827** | **(725,629,143)** | **403,570,779** | **1,362,086,094** | **1,229,855,665** | **763,862,696** |
| Dividends | | 0 | 0 | 0 | 0 | (475,648,700) | (612,123,905) | (666,636,325) | (788,593,051) | (917,572,738) | (1,073,064,149) |
| | | | | | | | | | | | |
| **Net Change in Cash** | **2,359,389,973** | **445,303,100** | **195,313,329** | **169,782,264** | **583,004,858** | **841,592,527** | **(113,505,238)** | **1,070,207,104** | **2,150,679,146** | **2,147,428,404** | **1,836,926,845** |
| Desired Cash Balance (Other than WC) | **(6,000,000)** | **(6,360,000)** | **(6,741,600)** | **(7,146,096)** | **(7,574,862)** | **(8,029,353)** | **(8,511,115)** | **(9,021,782)** | **(9,563,088)** | **(10,136,874)** | **(10,745,086)** |
| Cash Surplus/Deficit | **2,353,389,973** | **438,943,100** | **188,571,729** | **162,636,168** | **575,429,996** | **833,563,174** | **(122,016,353)** | **1,061,185,323** | **2,141,116,057** | **2,137,291,530** | **1,826,181,759** |
| Opening Cash Balance | 0 | 2,359,389,973 | 2,804,693,073 | 3,000,006,403 | 3,169,788,667 | 3,752,793,525 | 8,029,353 | 8,511,115 | 9,021,782 | 9,563,088 | 10,136,874 |
| Excess/(Fund Requirement) | 2,353,389,973 | 2,798,333,073 | 2,993,264,803 | 3,162,642,571 | 3,745,218,663 | 4,586,356,699 | (113,986,999) | 1,069,696,437 | 2,150,137,839 | 2,146,854,618 | 1,836,318,633 |
| Overdraft Requirement | | 0 | 0 | 0 | 0 | 0 | 113,986,999 | 0 | 0 | 0 | 0 |
| **Ending Cash balance before OD repayment** | **2,353,389,973** | **2,798,333,073** | **2,993,264,803** | **3,162,642,571** | **3,745,218,663** | **4,586,356,699** | **0** | **1,069,696,437** | **2,150,137,839** | **2,146,854,618** | **1,836,318,633** |
| Overdraft Repayment | | | | | | (4,586,356,699) | 0 | (1,069,696,437) | (2,150,137,839) | (2,146,854,618) | (1,836,318,633) |
| **Cash Balance After OD repayment** | **2,353,389,973** | **2,798,333,073** | **2,993,264,803** | **3,162,642,571** | **3,745,218,663** | **0** | **0** | **0** | **0** | **0** | **0** |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| **Overall Cash Balance** | **2,359,389,973** | **2,804,693,073** | **3,000,006,403** | **3,169,788,667** | **3,752,793,525** | **8,029,353** | **8,511,115** | **9,021,782** | **9,563,088** | **10,136,874** | **10,745,086** |

15%

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Beginning Overdraft Balance | 0 | 0 | 0 | 0 | 0 | 0 | -4,586,356,699 | -5,160,323,204 | -7,004,068,122 | -10,204,816,179 | -13,882,393,225 |
| Interest | 0 | 0 | 0 | 0 | 0 | 0 | -687,953,505 | -774,048,481 | -1,050,610,218 | -1,530,722,427 | -2,082,358,984 |
| Additional Overdraft | 0 | 0 | 0 | 0 | 0 | 0 | 113,986,999 | 0 | 0 | 0 | 0 |
| Overdraft Repayment | 0 | 0 | 0 | 0 | 0 | (4,586,356,699) | 0 | (1,069,696,437) | (2,150,137,839) | (2,146,854,618) | (1,836,318,633) |
| Ending Overdraft Balance | 0 | 0 | 0 | 0 | 0 | -4,586,356,699 | -5,160,323,204 | -7,004,068,122 | -10,204,816,179 | -13,882,393,225 | -17,801,070,841 |

# Profit and loss

**MEATU MILK PROJECT**

**Projected Comprehensive Income Statement**

4

TZS

| *ITEM* | | | Years | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
| **INCOME** | | | | | | | | | | | |
| Net Sales | | | 8,075,847,780 | 13,003,490,000 | 14,301,767,830 | 15,016,856,222 | 15,767,699,033 | 16,556,083,985 | 17,383,888,184 | 18,253,082,593 | 19,165,736,723 |
| Income from other facilities (5%) | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total Revenue** | | **0** | **8,075,847,780** | **13,003,490,000** | **14,301,767,830** | **15,016,856,222** | **15,767,699,033** | **16,556,083,985** | **17,383,888,184** | **18,253,082,593** | **19,165,736,723** |
| Cost of Production | | | 5,653,093,446 | 9,102,443,000 | 10,011,237,481 | 10,511,799,355 | 11,037,389,323 | 11,589,258,789 | 12,168,721,729 | 12,777,157,815 | 13,416,015,706 |
| Gross Profit | | | 2,422,754,334 | 3,901,047,000 | 4,290,530,349 | 4,505,056,867 | 4,730,309,710 | 4,966,825,195 | 5,215,166,455 | 5,475,924,778 | 5,749,721,017 |
| | | 1.05 | | | | | | | | | |
| **EXPENDITURE** | | | | | | | | | | | |
| Salaries (FT Staff) | | | 81,000,000 | 91,854,000 | 99,202,320 | 107,138,506 | 115,709,586 | 124,966,353 | 134,963,661 | 145,760,754 | 157,421,614 |
| Casual Labour | | | 16,200,000 | 18,370,800 | 19,840,464 | 21,427,701 | 23,141,917 | 24,993,271 | 26,992,732 | 29,152,151 | 31,484,323 |
| Water and Sewerage | | | 672,000,000 | 762,048,000 | 823,011,840 | 888,852,787 | 959,961,010 | 1,036,757,891 | 1,119,698,522 | 1,209,274,404 | 1,306,016,356 |
| Communication expenses | | | 6,000,000 | 6,804,000 | 7,348,320 | 7,936,186 | 8,571,080 | 9,256,767 | 9,997,308 | 10,797,093 | 11,660,860 |
| Repairs and maintenance | | | 3,000,000 | 3,402,000 | 3,674,160 | 3,968,093 | 4,285,540 | 4,628,383 | 4,998,654 | 5,398,546 | 5,830,430 |
| Cleanlines | | | 1,200,000 | 1,360,800 | 1,469,664 | 1,587,237 | 1,714,216 | 1,851,353 | 1,999,462 | 2,159,419 | 2,332,172 |
| Stationeries, uniforms and other supplies | | | 1,200,000 | 1,360,800 | 1,469,664 | 1,587,237 | 1,714,216 | 1,851,353 | 1,999,462 | 2,159,419 | 2,332,172 |
| Marketing Expenses | | | 24,000,000 | 27,216,000 | 29,393,280 | 31,744,742 | 34,284,322 | 37,027,068 | 39,989,233 | 43,188,372 | 46,643,441 |
| 2 Trucks Running Costs (200ltrs@2400/=*30) | | | 172,800,000 | 195,955,200 | 211,631,616 | 228,562,145 | 246,847,117 | 266,594,886 | 287,922,477 | 310,956,275 | 335,832,777 |
| Generator Running Costs (10 ltrs@2400/=*30) | | | 8,640,000 | 9,797,760 | 10,581,581 | 11,428,107 | 12,342,356 | 13,329,744 | 14,396,124 | 15,547,814 | 16,791,639 |
| Oversight Costs (Board Meetings) | | | 37,400,000 | 42,411,600 | 45,804,528 | 49,468,890 | 53,426,401 | 57,700,514 | 62,316,555 | 67,301,879 | 72,686,029 |
| Insurance Premium (building 0.5%) | 0.50% | 1% | 4,925,281 | 5,319,303 | 5,744,848 | 6,204,435 | 6,700,790 | 7,236,854 | 7,815,802 | 8,441,066 | 9,116,351 |
| Insurance Premium (Truck 3%) | 3% | 1% | 5,923,008 | 6,396,849 | 6,908,597 | 7,461,284 | 8,058,187 | 8,702,842 | 9,399,069 | 10,150,995 | 10,963,074 |
| Other Admin. Expenses | | 1.1 | 1,200,000 | 1,296,000 | 1,399,680 | 1,511,654 | 1,632,587 | 1,763,194 | 1,904,249 | 2,056,589 | 2,221,116 |
| **Total Expenditure** | | ***1*** | ***1,035,488,289*** | ***1,173,593,112*** | ***1,267,480,561*** | ***1,368,879,006*** | ***1,478,389,326*** | ***1,596,660,472*** | ***1,724,393,310*** | ***1,862,344,775*** | ***2,011,332,357*** |
| | | | | | | | | | | | |
| ***Profit before Depreciation & Interest Charge*** | | ***-1*** | ***1,387,266,045*** | ***2,727,453,888*** | ***3,023,049,788*** | ***3,136,177,861*** | ***3,251,920,384*** | ***3,370,164,723*** | ***3,490,773,145*** | ***3,613,580,003*** | ***3,738,388,660*** |
| Depreciation **(Annex 1)** | | | (227,721,625) | (227,721,625) | (227,721,625) | (227,721,625) | (228,363,225) | (453,998,825) | (453,998,825) | (453,998,825) | (478,998,825) |
| | | | | | | | | | | | |
| Loan Interest Charges | | 225,000,000 | 225,000,000 | 225,000,000 | 199,296,696 | 169,737,896 | 135,745,277 | 96,653,765 | 51,698,525 | 0 | 0 |
| Overdraft Interest Charge | | 0 | 0 | 0 | 0 | 0 | 0 | 687,953,505 | 774,048,481 | 1,050,610,218 | 1,530,722,427 |
| **Profit/Loss Before Tax** | | **224,999,999** | **1,384,544,420** | **2,724,732,263** | **2,994,624,859** | **3,078,194,132** | **3,159,302,436** | **3,700,773,168** | **3,862,521,326** | **4,210,191,396** | **4,790,112,262** |
| Corporate Tax - 30% | 30% | | (415,363,326) | (817,419,679) | (898,387,458) | (923,458,240) | (947,790,731) | (1,110,231,950) | (1,158,756,398) | (1,263,057,419) | (1,437,033,679) |
| **Profit/Loss After Tax** | | **224,999,999** | **969,181,094** | **1,907,312,584** | **2,096,237,402** | **2,154,735,893** | **2,211,511,705** | **2,590,541,217** | **2,703,764,928** | **2,947,133,978** | **3,353,078,583** |
| Dividends - 50% | 50% | | 0 | 0 | 0 | 0 | (1,105,755,853) | (1,295,270,609) | (1,351,882,464) | (1,473,566,989) | (1,676,539,292) |
| | | | | | | | | | | | |
| Retained Earnings | | 224,999,999 | 969,181,094 | 1,907,312,584 | 2,096,237,402 | 2,154,735,893 | 1,105,755,853 | 1,295,270,609 | 1,351,882,464 | 1,473,566,989 | 1,676,539,292 |
| | | | | | | | | | | | |
| **Accumulated Retained Earnings** | | **224,999,999** | **1,194,181,093** | **3,101,493,677** | **5,197,731,079** | **7,352,466,972** | **8,458,222,824** | **9,753,493,433** | **11,105,375,897** | **12,578,942,886** | **14,255,482,177** |

## Balance Sheet

MEATU DISTRICT COUNCIL
PROPOSED MEATU MILK PROJECT
PROJECTED BALANCE SHEETS

**MEATU MILK PROJECT**
**PROJECTECTED BALANCE SHEETS**

**TZS**

| ***ITEM*** | Years | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **1** | | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| | 2017 | | **2018** | | **2019** | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** |
| **FIXED ASSETS** | | | | | | | | | | | | | |
| Opening Balance | 4,214,800,219 | | 4,214,800,219 | | 3,987,078,594 | 3,759,356,969 | 3,531,635,344 | 3,303,913,720 | 3,275,550,495 | 4,000,649,670 | 3,546,650,845 | 3,092,652,021 | 2,613,653,196 |
| Additions | | | 0 | | 0 | 0 | 0 | 200,000,000 | 1,179,098,000 | 0 | 0 | 0 | 300,000,000 |
| **Total** | **4,214,800,219** | | **4,214,800,219** | | **3,987,078,594** | **3,759,356,969** | **3,531,635,344** | **3,503,913,720** | **4,454,648,495** | **4,000,649,670** | **3,546,650,845** | **3,092,652,021** | **2,913,653,196** |
| Less:Depreciation | | | 227,721,625 | | 227,721,625 | 227,721,625 | 227,721,625 | 228,363,225 | 453,998,825 | 453,998,825 | 453,998,825 | 478,998,825 | 478,998,825 |
| ***Closing Balance*** | **4,214,800,219** | | **3,987,078,594** | | **3,759,356,969** | **3,531,635,344** | **3,303,913,720** | **3,275,550,495** | **4,000,649,670** | **3,546,650,845** | **3,092,652,021** | **2,613,653,196** | **2,434,654,371** |
| | | | | | | | | | | | | | |
| **CURRENT ASSETS:** | | | | | | | | | | | | | |
| Working Capital | 42,206,548 | 1.05 | 42,206,548 | | 44,316,875 | 46,532,719 | 48,859,355 | 51,302,323 | 53,867,439 | 56,560,811 | 59,388,852 | 62,358,294 | 65,476,209 |
| Accumulated Cash | 2,359,389,973 | | 2,804,693,073 | | 3,000,006,403 | 3,169,788,667 | 3,752,793,525 | 8,029,353 | 8,511,115 | 9,021,782 | 9,563,088 | 10,136,874 | 10,745,086 |
| **Sub-Total** | **2,401,596,521** | | **2,846,899,621** | | **3,044,323,278** | **3,216,321,386** | **3,801,652,880** | **59,331,676** | **62,378,554** | **65,582,593** | **68,951,940** | **72,495,168** | **76,221,295** |
| **TOTAL ASSETS** | **6,616,396,740** | | **6,833,978,215** | | **6,803,680,247** | **6,747,956,730** | **7,105,566,600** | **3,334,882,171** | **4,063,028,224** | **3,612,233,438** | **3,161,603,961** | **2,686,148,364** | **2,510,875,666** |
| **FINANCED BY:** | | | | | | | | | | | | | |
| **DEBT** | | | | | | | | | | | | | |
| Bank Loan | 1,500,000,000 | | 1,500,000,000 | | 1,328,644,640 | 1,131,585,976 | 904,968,513 | 644,358,430 | 344,656,835 | 0 | 0 | 0 | 0 |
| Overdraft | 0 | | 0 | | 0 | 0 | 0 | -4,586,356,699 | -5,160,323,204 | -7,004,068,122 | -10,204,816,179 | -13,882,393,225 | -17,801,070,841 |
| **TOTAL DEBT** | **1,500,000,000** | **32.4%** | **1,500,000,000** | **55.7%** | **1,328,644,640** | **1,131,585,976** | **904,968,513** | **-3,941,998,269** | **-4,815,666,370** | **-7,004,068,122** | **-10,204,816,179** | **-13,882,393,225** | **-17,801,070,841** |
| | | | | | | | | | | | | | |
| **EQUITY** | | | | | | | | | | | | | |
| MDC | 2,900,000,000 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Accumulates Ret. Earnings | 224,999,999 | | 1,194,181,093 | | 3,101,493,677 | 5,197,731,079 | 7,352,466,972 | 8,458,222,824 | 9,753,493,433 | 11,105,375,897 | 12,578,942,886 | 14,255,482,177 | 16,169,397,076 |
| **TOTAL EQUITY** | **3,124,999,999** | **67.57%** | **1,194,181,093** | **44.32%** | **3,101,493,677** | **5,197,731,079** | **7,352,466,972** | **8,458,222,824** | **9,753,493,433** | **11,105,375,897** | **12,578,942,886** | **14,255,482,177** | **16,169,397,076** |
| **TOTAL FINANCING** | **4,624,999,999** | | **2,694,181,093** | | **4,430,138,317** | **6,329,317,055** | **8,257,435,484** | **4,516,224,555** | **4,937,827,063** | | | | |

## Loan Repayment Schedule

**MEATU MILK PROJECT**

**INTEREST AND LOAN REPAYMENT SCHEDULE**

| | | |
|---|---|---|
| **The Profile of the Loan** | | |
| Tenure | **8** | **Years** |
| **Starting Year** | **2017** | |
| **Ending Year** | **2024** | |
| **Interest Rate** | 15.00% | |
| Grace Period | **2** | **Years** |
| Principal & Interest Repayment Period | 6 | |
| **Principal Due for Repayment** | **1,500,000,000** | |
| **Repayment Plan** | **Annually** | **Semi-Annually** |
| **Present Value Interest Factor of Annuity** | 3.784482694 | 7.735278275 |
| **Annuity** | 396,355,360 | **193,916,747** |

| ITEM | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** | **2023** | **2024** |
| | | | | | | | | |
| Balance | 1,500,000,000 | 1,500,000,000 | 1,500,000,000 | 1,328,644,640 | 1,131,585,976 | 904,968,513 | 644,358,430 | 344,656,835 |
| Adds | | | | | | | | |
| Interest | 225,000,000 | 225,000,000 | 225,000,000 | 199,296,696 | 169,737,896 | 135,745,277 | 96,653,765 | 51,698,525 |
| **TOTAL** | **1,725,000,000** | **1,725,000,000** | **1,725,000,000** | **1,527,941,336** | **1,301,323,873** | **1,040,713,790** | **741,012,195** | **396,355,360** |
| Repayment Annuity | | | 396,355,360 | 396,355,360 | 396,355,360 | 396,355,360 | 396,355,360 | 396,355,360 |
| Interest | 225,000,000 | 225,000,000 | 225,000,000 | 199,296,696 | 169,737,896 | 135,745,277 | 96,653,765 | 51,698,525 |
| Principal | | | 171,355,360 | 197,058,664 | 226,617,463 | 260,610,083 | 299,701,595 | 344,656,835 |
| **Balance** | **1,500,000,000** | **1,500,000,000** | **1,328,644,640** | **1,131,585,976** | **904,968,513** | **644,358,430** | **344,656,835** | **0** |
| | | | | | | | | |

## Fincial ratios

**MEATU DISTRICT COUNCIL**

**PROPOSED MEATU MILK PROJECT**

**KEY FINANCIAL RATIOS**

**TZS**

| ***ITEM*** | **Years** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** |
| **DEBT SERVICE COVERAGE** | | | | | | | | | | | |
| **RATIO (DSCR)** | | | | | | | | | | | |
| Profit/Loss After Tax | | 969,181,094 | 1,907,312,584 | 2,096,237,402 | 2,154,735,893 | 2,211,511,705 | 2,590,541,217 | 2,703,764,928 | 2,947,133,978 | 3,353,078,583 | 3,827,829,797 |
| Depreciation (Annex 1) | | 227,721,625 | 227,721,625 | 227,721,625 | 227,721,625 | 228,363,225 | 453,998,825 | 453,998,825 | 453,998,825 | 478,998,825 | 478,998,825 |
| Operating Cash Income (A) | | 1,196,902,719 | 2,135,034,209 | 2,323,959,026 | 2,382,457,517 | 2,439,874,930 | 3,044,540,042 | 3,157,763,753 | 3,401,132,802 | 3,832,077,408 | 4,306,828,621 |
| | | | | | | | | | | | |
| Loan redemption (B) | | 396,355,360 | 396,355,360 | 396,355,360 | 396,355,360 | 396,355,360 | 396,355,360 | | | | |
| | | | | | | | | | | | |
| Debt Service Coverage Ratio (A/B) | | 3.02 | 5.39 | 5.86 | 6.01 | 6.16 | 7.68 | | | | |
| | | | | | | | | | | | |
| **RETURN ON INVESTMENT (ROI)** | | | | | | | | | | | |
| Profit/Loss Before Tax | | 1,384,544,420 | 2,724,732,263 | 2,994,624,859 | 3,078,194,132 | 3,159,302,436 | 3,700,773,168 | 3,862,521,326 | 4,210,191,396 | 4,790,112,262 | 5,468,328,281 |
| | | | | | | | | | | | |

## 7.3 Annex III: Quotation of Plant and equipment by Encon Engineering (India)