

# FAO Prevention of Food Losses Programme

## **Milk and Dairy Products, Post-harvest Losses and Food Safety in Sub-Saharan Africa and the Near East.**



## **A Review Of The Small Scale Dairy Sector – Tanzania**

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## Table of contents

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TABLE OF CONTENTS.....	I
<i>LIST OF ABBREVIATIONS</i> .....	ii
<i>EXECUTIVE SUMMARY</i> .....	iii
<i>INTRODUCTION</i> .....	1
<i>1. Background</i> .....	3
1.1 HISTORY OF GOVERNMENT AND PRIVATE SECTOR INVOLVEMENT .....	3
1.2 INSTITUTIONAL AND POLICY FRAMEWORK FOR DAIRY DEVELOPMENT .....	3
<i>2. Strategies for dairy development (1970-2002)</i> .....	5
2.1 DAIRY CATTLE IMPROVEMENT STRATEGIES .....	5
2.2 DAIRY DEVELOPMENT PROGRAMMES AND DONOR SUPPORT. ....	7
<i>3. Milk marketing and processing</i> .....	12
3.1 HISTORY OF ORGANISED MILK MARKETING AND PROCESSING .....	12
<i>4. Lessons learnt from past and on-going interventions</i> .....	13
4.1 USE OF DAIRY COMMODITY AID.....	13
4.2 DAIRY HERD GROWTH AND BREEDING.....	13
4.3 HEIFER- IN- TRUST SCHEMES.....	13
4.4 MILK PROCESSING AND MARKETING .....	13
4.5 INSTITUTIONAL SETUP AND FARMER ORGANISATIONS .....	14
<i>5. The Evolution of Dairy Policy.</i> .....	15
<i>The functions of the GA are to:</i> .....	17
<i>6. Dairy production systems</i> .....	18
6.2 ANIMAL HEALTH SERVICES DELIVERY SYSTEMS.....	18
6. 3 EFFICIENCY AND ECONOMICS OF MILK PRODUCTION .....	19
6.4 MILK PRODUCTION, SUPPLY AND DEMAND .....	19
<i>7. Current milk marketing and processing</i> .....	23
<i>8. Post-harvest losses in small-scale dairy sector</i> .....	26
<i>9. Consumption patterns and consumer preferences</i> .....	27
<i>9. Consumption patterns and consumer preferences</i> .....	28
<i>10. Milk marketing and public health risks</i> .....	29
<i>11. Importance of dairy information systems</i> .....	31
<i>12. SWOT analysis of the Tanzania dairy Industry</i> .....	32
<i>13. The current progress and future of the dairy Industry in Tanzania</i> .....	34
13. 1 POTENTIAL ROLE OF SMALL SCALE DAIRY FARMERS AND THEIR ORGANIZATIONS .....	34
13.2 ROLE OF OTHER REGULATORY BODIES AND INSTITUTIONS.....	34
13.3 STRATEGY FOR INCLUSION OF INFORMAL SECTOR.....	35
13.4 CRITICAL CONTROL POINTS FOR THE IMPROVEMENT OF FOOD SAFETY IN THE DAIRY PRODUCER TO CONSUMER CHAIN.....	35
<b>14. RECOMMENDATIONS</b> .....	<b>38</b>
14.1 RECOMMENDATIONS FOR REDUCING POST-HARVEST LOSSES .....	38
14.2 TECHNOLOGY TRANSFER.....	38
14.3 TRAINING.....	39
14.4 INFORMATION PLATFORM.....	39
<i>References/Bibliography</i> .....	40

# LIST OF ABBREVIATIONS

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ASMP	Agricultural Sector Management Programme
CRDB	Co-operative and Rural Development Bank
DAFCO	Dairy farming Company Ltd
DANIDA	Danish International development Agency
DFID	Department for international development
EEC	European Economic Community
EU	European Union
FAO	Food and Agricultural organization of the United Nations
GDP	Gross Domestic Product
GHP	Good hygienic practices
GMP	Good manufacturing Practices
HACCP	Hazard Analysis Critical Control points
HBU	Heifer Breeding Unit
HIT	Heifer in Trust Scheme
HPI	Heifer project International
IDA	International development Agency
ILRI	International Livestock Research Institute
KADADET	Kagera dairy Development Trust
KALIDEP	Kagera Livestock Development Project
KNCU	Kilimanjaro Native Co-operative Union
LIDA	Livestock Development Authority
LME	Liquid milk equivalent
LMU	Livestock Multiplication Units
MALD	Ministry of Agriculture and Livestock development
MLD	Ministry of Livestock development
MOAC	Ministry of Agriculture and Co-operatives
MWLD	Ministry of Water and Livestock Development
NAFCO	National Food Control Commission
NARCO	National Ranching Company
NFCC	National Food Control Commission
NGOs	Non Governmental organisations
NORAD	Norwegian agency for International Development
ODA	Overseas Development Organisation, UK
PRSP	Poverty reduction strategy paper
SDC	Swiss Development Agency
SDSP	Smallholder Dairy Development programme
SHDDP	Southern highlands Dairy Development programme
SMP	Skim Milk powder
SNV	Netherlands development agency
SURUDE	Foundation for Sustainable Rural Development
SWOT	Strengths, Weaknesses, Opportunities and Threats
T.Shs	Tanzania Shilling
TADAT	Tanga Dairy Trusts
TAMPA	Tanzania Milk Processors Association
TAMPRODA	Tanzania Milk Producers Association
TBS	Tanzania Bureau of Standards
TDDB	Tanzania Dairy Development Board
TDDP	Tanga Dairy Developemnt programme
TDL	Tanzania dairies Ltd
TFDA	Tanzania Food and Drug Authority
TLMC	Tanzania Livestock Marketing Corporation
TSA	Tanzania Sisal Authority
TSDDP	Tanga Smallholder dairy development programme
TSZ	Tanzania Shorthorn Zebu
UNDP	United Nations Development programme
UNICEF	United Nations Children Fund
WFP	World Food programme

## EXECUTIVE SUMMARY

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The paper presents 13 sections on the Dairy industry development in Tanzania. Section one gives general background followed by a historical overview of dairy breeding, production marketing and processing. The years 1970 – 1990 were dominated by government interventions in the dairy industry. Large scale farms were managed by parastatal company, DAFCO while processing was carried out by the Tanzania Dairies Ltd (TDL). A national dairy Board ceased to function in 1973 when a parastatal apex organization, Livestock Development Authority (LIDA) was charged with controlling both TDL and DAFCO.

The early 1980s witnessed the evolution of smallholder dairy development programmes supported by several bilateral and multilateral donor organizations. Notable examples are the Swiss assisted dairy development programme in the Southern Highlands of Iringa and Mbeya Regions since 1978. In Kagera and Tanga regions the Dutch Government introduced dairy development programmes in 1982 and 1985 respectively. The result of these and other dairy development programmes have resulted in considerable engagement of smallholder farmers in dairy farming. Out of 16.9 million cattle, about 450,000 are crossbred dairy cattle managed on small holding of 1-2 acres each rearing 2-3 animals compared to 10.7 cattle per traditional cattle owning household in the country.

Milk production is estimated at about 900 million litres per annum. This gives an average per capita consumption of about 26 litres in a country of 34 million people. This level of consumption is far lower than the recommended level of 100 litres per annum or that of neighbouring countries .

Milk marketing is dominated by the informal sector who transfer about 240 million litres annually from producers to consumers. About 10 small scale – medium scale plants with a total processing capacity of 500,000 litres per day (178 million/annum) handle an estimated 40 million litres per annum, only or 22% of installed capacity. Some have closed down only several months after coming into operation, a situation which calls for closer scrutiny of the reasons behind this development in a liberalized economy. Small scale processing, especially of cultured milk and cheese by women groups is on the increase. Quality, however, is still variable.

Studies done recently in the country, indicating that the quality of a considerable proportion of raw milk and other products marketed by the informal sector, is below standard and the problems of adulteration, particularly in Mwanza, and the presence of antibiotic residues in both Mwanza and Dar es salaam milk shed areas above permissible maximum limits are issues of concern.

A SWOT analysis of the dairy industry indicates how the strengths can be further consolidated, weaknesses overcome, opportunities exploited and threats minimized. The role of women in smallholder dairy development, through not only production but also marketing and processing and farmer organizations is discussed.

The paper concludes by highlighting the role of farmers and other stakeholder organizations, through the proposed Tanzania Dairy Development Board (TDDDB) to bring about the desired development. The informal milk market players will have to be integrated in the dairy industry in a way that promotes improvements in milk and milk products quality and safety. Training of farmers and other players in dairy hygiene, marketing and processing techniques and in farmers organizational and institutional capacity building will have to be addressed more vigorously than has hitherto been the case.

# INTRODUCTION

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Providing adequate nutrition and attaining self sufficiency in food supply for her human population has been the cornerstone of Tanzania's food policy in the last thirty years (Livestock Policy 1983; Agricultural Policy ,1997). On the economic front Tanzania, has embarked on different policies aimed at raising the living standards of the population and eliminating abject poverty by 2025 (PRSP, 2000). The livestock sub-sector has been contributing towards achieving the twin objectives of household food security and income.

The livestock sub-sector contributes about 8% of the total GDP and 30% of Agricultural GDP. The dairy industry contributes 30% of the livestock GDP, Beef (40%) and other livestock (30%) (MoAC, 1997). The per capita consumption of livestock products by the human population of 34 million is only 7 kg of meat, 26 litres of milk and 11 eggs per annum. The recommended FAO figures for normal human health is 50 kg of meat and 100 litres of milk per annum.

An estimated 680 million litres of milk is used on-farm thus contributing to household food security. About 210 million litres is marketed at average price of 150 shs per litre thus contributing to 31.5-billion T.shs to household incomes. Out of the marketed milk, about 40 million litres is processed in dairy factories ranging from micro-dairies processing less than 500 litres per day to small scale factories processing up to 5,000 litres per day. There are only three factories (Royal Dairy – in Dar Es Salaam, Musoma Dairy- in Musoma; New Northern Creameries-in Arusha) processing over 15,000 litres per day even though installed capacity in these (large scale!) factories is more than 40,000 litres per day.

The dairy industry has the potential to contribute more to household incomes and food security. This potential is constrained by seven problems identified by sub-sector stakeholders who met at a national Conference Chaired by the President of the United Republic of Tanzania, Hon. President Benjamin William Mkapa<sup>1</sup>. These include , in order of importance:

- a) Inadequate land (tenure system), water and animal feeds including pastures and rangelands;
- b) Type of livestock and production systems;
- c) Poor animal diseases surveillance and control system;
- d) Inadequate Marketing and processing infrastructure;
- e) Operational constraints including policy, institutional structures and human resources;
- f) Inadequate farmers' training, information access to farmers (and other stakeholders)
- g) Inadequate credit facilities.

The objective of this paper is to carry out an assessment of the status of the dairy industry in Tanzania, identify strengths, Weaknesses, Opportunities and Threats in a pro-active manner from a

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<sup>1</sup> Following the inauguration of the 3<sup>rd</sup> Phase Government in 2000, the Livestock Division under the Ministry of Agriculture and Co-operatives was brought under a new of Ministry Water and Livestock Development, where it features as a full Department for the first time in many years. This move was made with the objective of giving the Livestock sub-sector more priority and address its problems more vigorously than ever before. A strategic planning exercise initiated by Minister, Hon. Mr. Edward Lowasa (MP) culminated in a three day national conference held at AICC, Arusha (April, 2001) that brought together over 300 livestock sub-sector stakeholders to deliberate on the current status of the sub-sector and the way forward. The Conference was chaired by the President and attended by the Vice president and many high level government dignitaries. It was a milestone convention whose deliberations will for the next five years and beyond, set the direction of development of the sub-sectors under the overall Poverty Reduction Strategy Paper (PRSP) and the Agricultural Sector Development Programme (ASDP) in particular.

historical, contemporary and futuristic point of view. The SWOT analysis will be used to identify strategies that can:

- Make use of current strength to further develop the industry
- Correct current weaknesses
- Exploit current and future opportunities
- Avert current and future threats

The place of women in smallholder dairy development will receive special attention as it forms a cornerstone of the industry both at farm level and in marketing and processing.

The future development of the dairy industry has to be undertaken within the context of the overall vision for the livestock industry as was articulated by livestock industry stakeholders, the Kiswahili version of which states: “ **there is to be a livestock sector with sustainable production systems of high productivity conducted on a commercial basis; which improves the livelihoods, employment, availability of raw materials for industry and contributes more significantly to national income and conservation of the environment**”

# 1. Background

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## 1.1 History of Government and private sector involvement

During the colonial period there were only few large-scale farms owned by government and by settler farms mostly in the Northern and Southern highlands as well as around major cities especially Dar es salaam<sup>2</sup>. After independence, most of the large dairy farms were nationalized and operated by parastatals.

## 1.2 Institutional and policy framework for dairy development

In the past Government played a key role in steering dairy development in Tanzania by being directly involved in production, processing and marketing and through its policies, Laws and regulations. During the colonial period, there were only few large-scale farms. After independence, most of the large dairy farms were nationalized in 1967 and operated by parastatals. This was in line with policies of that time: **Socialism (Ujamaa) and Self reliance**. The aim was to increase milk production to cope with the rapidly increasing urban demand and to reduce dependency on the importation of milk and milk products.

For a long time the livestock policies put forward by the government aimed at supplying milk to urban centres especially Dar es Salaam as cheaply as possible (Sumberg, 1997). The most definite policy on livestock development since independence was formulated in 1983 (MLD, 1983). However, a number of development efforts and strategies to increase domestic milk production were undertaken prior to 1983.

Between 1961 – 1965 the operation of the dairy industry in Tanzania was governed by the “Dairy Industry Ordinance No. 61 of 1961 cap 456 of the Laws of the then Tanganyika. Under this law, Zonal dairy boards were established in “*areas which produced sufficient amounts of milk to warrant establishment of a dairy plant*” (Boki, 1998). The Zonal Boards’ functions were:

- Opening and running of dairy farms and milk processing plants
- Collecting, cooling and marketing of milk and milk products from farmers
- To strengthen the link between farmers, milk processors and distributors
- To conduct market research and education relevant to specialised groups within the dairy industry
- To provide essential services to dairy farmers and processors (Registration, Licensing, Veterinary services, Livestock inputs, and testing and grading of milk)

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<sup>2</sup> See detailed historical description of the pre-independence and post independence developments by SUMBERG, J. (1997). Policy, Milk and the Dar es Salaam peri-urban zone: A new future from an old development theme? The paper provides analysis of 50 years of policy aimed at ensuring an adequate supply of milk to Dar Es Salaam. A number of approaches and initiatives have been used to increase milk production in and around the city. However, despite those efforts supply of milk to DSM is still problematic. The paper argues that policy and development initiatives must specifically consider alternatives of transferring milk production from urban/peri-urban zone to more suitable farming areas outside the capital. Following liberalization of the dairy industry in 1995/96, the effects of free market have started being felt in Dar es salaam where prices of raw milk have declined by >30% in the last three years ( from 350-400shs/litre in 1995 to about 230 By 2003.

Zonal Boards were allowed to charge fees for registration, licensing and other services; appoint inspectors etc. Farmers, mostly settler farmers, owned between 15-40% of the share capital in the processing plants.

Table 1 shows policy and institutional changes in dairy development since independence in 1961.

**Table 1: Policy, regulatory and institutional development of the Tanzania Dairy Industry (1961 –2003)**

Year	Policy/Regulation	Institutional structures	Remarks/Functions
1961-1965	Dairy Industry Ordinance	Zonal Dairy Boards	Participants were farmers, milk transporters, milk processors; distributors ; importers and consumers
1965	Dairy Industry Act No. 32 of 1965 Cap. 591	National Dairy Board Established	-ditto-
1973			The National Dairy Board not reconstituted by the Minister responsible for Agriculture after expiry of its term in 1973
1974	Tanzania Livestock Development Authority (LIDA) established by Act of Parliament No. 10, 1978.	LIDA established as holding company for TLMC , Tanzania Feeds Co. Ltd; and later TDL and DAFCO	LIDA and its subsidiaries undertook some of the functions of the NDB. Dairy Act was however never repealed to date.
1975	TDL established by Act of Parliament	Operated as subsidiary of LIDA with 7 dairy plants	
	DAFCO established by Act of Parliament	-ditto- with large scale dairy farms	
1978	Food Quality Control Act established by Act of Parliament	National Food Control Commission established under same act;	
1981	Food Quality Control Act 1978 reviewed		
1983	Tanzania Livestock policy established	Smallholder dairy development projects started in Kagera(KALIDEP, 1982); in Tanga; TSDDP(1985) ; SHDDP expanded; LMUs	Policy on raw milk sales to consumers where dairy plants existed not followed up by legislation/enforcement
1988	Milk pricing decontrolled		Pan-territorial pricing abolished
1995	TDL liquidated		
1996-1998	TDL plants rivatized; some DAFCO farms privatised		Royal Dairies took over the Dar es Salaam plant; Tabora; Tanga; Musoma and Arusha Plants have been bought
1998-2002	Stakeholders resolve to establish an autonomous dairy Development Board	Task Force funded by the Austrian Government	June 2002 a draft Bill to establish an autonomous dairy development Board is adopted by stakeholders during the 3dr dairy development conference, elects an interim Dairy Board
2003	Dairy Industry Act, 2003 enacted by Parliament	Interim Dairy Board Established with Secretariat in Dar es Salaam	Expected to be enacted 2 <sup>nd</sup> half of 2003.



## **2. Strategies for dairy development (1970-2002)**

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### **2.1 Dairy cattle improvement strategies**

Various strategies to improve and expand the dairy industry in Tanzania have been attempted with varying degrees of success and failure. These are briefly reviewed below.

#### **2.1.2 Early Selection Work**

The milk production potential of the Tanzania Short horn Zebu is generally low with estimates ranging from 530 - 950 kg per lactation of 232 - 257 days long (Msechu et al, 1987; Msechu, 1988). Efforts to raise local cattle productivity in Zanzibar (Tidbury, 1954) and Uganda (Williams and Bunge, 1952) achieved only a limited increase in yield not exceeding 920 - 950 kg per lactation (Mpiri, 1994). Since most selection work was done on-station with improved management, it was not easy to isolate the effect of genetic improvement due to selection on the apparent improvement in productivity.

In view of these limitations, further work on improvement of traditional zebu cattle for milk production had focused on cross-breeding. Crossbreeding zebu cows with *Bos taurus* cattle raises the productivity of the cross-bred animals to 1500 - 2000 litres per lactation, i.e. doubling of the potential yield of the Zebu in one generation. However, with crossbreeding comes the dilution of the genetic resistance to tropical diseases and requirements for improved feeding and management and may pose a threat to long term genetic conservation of local genetic resources.

#### **2.1.3 Development of the Mpwapwa Breed.**

In view of the limitations of crossbreeding and subsequent upgrading towards *Bos taurus* the Ministry of Agriculture under the colonial government initiated work in 1932-35 to crossbreed exotic dairy cattle with indigenous zebu at Mpwapwa livestock research station. As a result the Mpwapwa synthetic breed was developed with an average composition of 35% Red Sindhi, 20% a Sahiwal, 10% Boran, 20% TSZ, 5% Ankole and about 10% exotic blood, mainly Ayrshire. The herd was closed in 1956 for selection work (Getz, 1974). The average milk yield has been reported to be about 1660 kg (Das *et al*, 1986). The unfortunate story about the Mpwapwa cattle is that most of the developmental work had taken place on station. It was only in 1986 when on-farm evaluation of the Mpwapwa cattle started (Kasonta and Mkonyi, 1990). The recorded performance was 1626 kg lactation milk yield in 300 days duration. Calving intervals averaged 498 days. Average daily yield was 5.5 kg (Rushalaza *et al*, 1993). Unfortunately no efforts were made to multiply the Mpwapwa breed for distribution to smallholder farmers. To date the Mpwapwa breed remains under exploited and the herd population has dwindled over the years. FAO has already declared the Mpwapwa breed as an endangered breed. Reliable information indicate that currently there are less than 500 breeding females in the various research stations in the country. Further conservation work of the breed has been in the pipeline for sometime now and currently multiplication work is on going with assistance from Tanzania/Japanese Counterpart Fund grant.

#### **2.1.4 Direct importation of *Bos taurus* dairy breeds.**

Tanzania has imported live heifers and bulls from various parts of the world. Massive importation took place in the 1970's where heifers and bulls were air freighted from USA, New Zealand, Kenya and Zimbabwe. Between 1975 and 1993, 1039 heifers from New Zealand and USA were imported

into the country. The World Bank loan and grants from HPI had been instrumental in effecting these importations. No hard figures are available on national total importation. At Kitulo dairy farm, for example, between October 1975 and October 1978, 890 heifers were donated by Heifer Project International (HPI). The aim was to stock large scale farms where they would multiply and thereafter surplus heifers be distributed to smallholder farmers. However, due to poor reproductive performance and high mortality rates, no appreciable surplus heifers have been generated from the parastatal farms.

### ***2.1.5 Crossbreeding of Zebu cattle with Bos Taurus.***

In order to increase the genetic potential for milk, crossbreeding of the local cattle to *Bos taurus* European dairy breeds has been pursued as a means of increasing domestic milk production in the country since soon after independence in 1961 to date. Various strategies have been employed including use of Bull centers, Heifer multiplication farms and use of AI.

#### ***2.1.5.1 Use of Village Bull Centres.***

Under the 1975 Dairy Development Programmes about 50 village dairy farm units were planned to be established under village government (communal) ownership under the now defunct *Ujamaa* socialist development policy. Farmers in the selected model villages were provided with a few dairy cattle and a bull, which could be used to mate with the dairy cattle and the indigenous stock. The management of the dairy herd was under the management of village government with the designated managers having very little decision-making powers. None of these village dairy farms ever prospered largely because of poor management and lack of insurance in case the female cow died due to disease or accidents.

#### ***2.1.5.2 Government / Project Bull Centres.***

Another strategy which has been tested in Tanzania was the provision of government or project operated bull centres which was supposed to serve farmers of one or several villages. The management of the bull centre is done by the government/project extension service. This was attempted in the early stages of the Swiss funded Southern highlands development project (Mchau and Mwakatumbula, 1996). This approach was never successful due to poor management of the bulls.

#### ***2.1.5.3 Crossbreeding by Use of AI.***

AI has not been used significantly as a way of producing F<sub>1</sub> crossbreeds within the farmers' own traditional herds. The main limitation has been lack of the necessary infrastructure for an extensive AI scheme. AI has been used with some measure of success on parastatal ranches and heifer breeding units (HBUs)

#### ***2.1.5.4 Heifer breeding units (HBUs)-LMUs.***

In order to increase the supply of F<sub>1</sub> dairy heifers, heifer breeding units (HBUs) (or livestock multiplication units (LMUs) were established. The plan was to have one HBU in each region. HBUs were stocked with TSZ or Boran cows for crossbreeding with exotic sires mainly Friesian, Ayrshire and Brown Swiss. By late 1980s seventeen regions had already established their HBUs through WFP and government funding.

About 2000 heifers were produced from these units annually against an estimated national demand of 8000 heifers (Massae, 1993) and a production target of 5000 heifers per year (MALD, 1989). The performance of HBUs has thus been rather low and moves towards privatisation of some HBUs/LMUs are underway in accordance with World Bank supported Agricultural Sector

Management Programme (ASMP). It is now planned to remain with only 5 LMUs ( Kiyulo, Ngerengere, Sao Hill, Nangaramo and Mabuki) under the government. Some NARCO ranches (Kalambo, Mzeri, Ruvu and Kikulula Complex) are producing F1 heifers.

#### *2.1.5.5 Heifer- in-trust (HIT) schemes.*

The heifer in-trust scheme was introduced by HPI working with the Lutheran Church in Arusha, Northern Tanzania. It is a strategy considered appropriate for resource poor farmers, especially women. The HIT approach involves loaning a pregnant heifer to a recipient who in turn is required to pay back to the scheme a pregnant heifer born on his/her farm. They are required to meet certain conditions such as preparing a zero grazing unit, planting at least one acre of fodder grass/legume, attending training and keeping of records. The initial prototype model was introduced by HPI in 1978. It started with 33 heifers in three villages. The model has since been adopted by several dairy development programmes with modifications (Kinsey, 1998). The Dutch funded Projects in Tanga and Kagera regions have used this approach quite successfully (de Jong, 1996). Later on HIT has been used by SHDDP and WFP Tan 2247 projects. For successful implementation, a lot of close follow-up, called Monitoring in KALIDEP, together with appropriate extension services, has to be provided on a continuous basis. This means the external costs to the farmer can be quite high, up to 40% of the producer price of milk (Rutamu and Munster, 1998). The recovery rate varies but with good monitoring a recovery/pass-on rate of 60 – 70% has been achieved (Houterman, 1993, Nzunda, 1998).

## **2.2 Dairy development programmes and donor support.**

Closing the gap between the growing demand and domestic milk production was one of the objectives of the first (1964 - 1969) and second five-year development plan (1969 - 1974). This led to the establishment of a National Dairy Board in 1965 to ensure that the set targets were achieved and to promote, organize, regulate, develop the production, processing, marketing, distribution of milk and milk products, but the implementation of the programmes were disappointing.

The first and second five-year development plan (1964 - 1969 and 1969 - 1974), observed with concern the growing gap between domestic milk production and National Milk demand. This prompted the establishment of a **Government controlled , National Dairy Board** in 1965 under Dairy Industry Act no. 32 of 1965 cap 590 of the Laws of Tanzania. The National Dairy Board was charged with the following functions:

- Advise the Government on all matters affecting the dairy sector
- Promote, organize, regulate, develop the production, processing, marketing, distribution of milk and milk products
- Establish and run dairy farms and milk processing plants
- Register and license all dairy industry players (importers, distributors, processors, retailers etc)
- Fix milk prices
- Make bylaws for safeguarding the dairy sector
- Promote milk marketing development research in relation to milk and milk products
- Improve the quality of milk and milk products

The period 1965 - 1970 was marked by the nationalisation of large scale dairy farms and processing plants. Farmers thus lost the 15 – 40% shares they held in the milk processing plants and the plants lost partnership with farmers. The NDB became moribund in 1973 when the Minister of Agriculture did not appoint new board members upon expiry of its tenure. Instead, a Livestock Development Authority (LIDA) was formed in 1974 to oversee the functioning of two subsidiary companies; the Dairy Farming Company (DAFCO) and Tanzania Dairies Ltd. (TDL).

The third five-year Development Plan (1975 - 1980) had the main objective of enabling the country attain self-sufficiency in milk supply. A long term "National Dairy Plan" was launched so as to achieve this goal. It is during this period that DAFCO and TDL were established, with the aim ensuring smooth management of the dairy industry. Yet performance of these dairy parastatals were disappointing due to management problems, foreign currency shortages, and non-availability of suitable dairy cattle to increase milk production.

In the area of dairy development the largest single input was the IDA credit for Phase One Dairy Development. This programme attracted a number of multilateral and bilateral support, mainly in the form of technical assistance. There were other significant multilateral and bilateral inputs, but these were directed more towards the commercial or large-scale milk sector, which produced and supplied milk for the urban population.

The most significant dairy development projects since 1975 were as follows:

### ***2.2.1 Phase One Dairy Development (IDA Credit 580 TA)***

The first major long term Dairy Development Programme in Tanzania was conceived and prepared by the government in 1974 and submitted to the World Bank (IDA) for funding in May 1975. The components of the programme included support to the rehabilitation and expansion of commercial dairy production on parastatal farms, improve milk collection and processing facilities and establishment of Livestock Multiplication Units (LMUs) later on known as Heifer Breeding Units (HBUs) for production of dairy heifers through crossbreeding of local zebu cattle to *Bos taurus* dairy breed bulls. In particular the programme included the following components.

- (i) Establishment and development of 17 dairy Units of about 350 cows each at 9 locations. The farms were to be run on commercial basis by DAFCO's (8 Units), KNCU (3 units), Tanzania Sisal Authority (5 units) and NAFCO (one Unit).
- (ii) Development of small dairy units of about 20 cows each in 50 "Ujamaa" villages. The units would be based on upgraded cattle from HBU and run as commercial ventures.
- (iii) Establishment of Dairy Heifer Breeding Units, Service breeding Units were to be under NARCO, DAFCO, TSA and the ministry to produce F<sub>1</sub>-dairy-heifers for sale to dairy farmers.
- (iv) Technical Assistance. A total of 30 man years of technical assistance were to be provided to assist the implementation of the dairy programme in Tanzania.

The total cost of the programme was estimated at US\$ 15.3 million of which IDA approved a credit ceiling of US\$ 10 million, the balance was to be financed by the Government of Tanzania and the beneficiaries of the credit.

The project objective was to increase milk production in government and parastatal farms, many of which already existed and urgently required substantial investments and improved management. Milk thus produced would help to fill the large deficit of dairy products for the major urban markets, and reduce imports of dairy products (Mwakatundu and Masanje, 1984).

#### *Implementation of Phase One Dairy Development:*

Most of the efforts were put into the expansion and rehabilitation of large-scale farms under parastatal companies and rehabilitation of milk processing plants, but for a variety of reasons, the results were disappointing.

Of the 17 large scale farms that were established, only 12 were (partially) developed. The original two of the original Heifer Breeding Units (Muruzi, Kikulula & Ngerengere) were considered financially non-viable for a CRDB loan and stopped in 1981. Of the 50 proposed "Ujamaa" Village Dairy Units only six (6) were eventually implemented. By January 1982, CRDB had approved 57 Dairy Farming Loans, but due to a shortage of heifers in the country, most of these projects did not take off and those which took off performed poorly.

### **2.2.2 Food Commodity Projects**

Dairy commodity projects were linked to dairy investment projects in the livestock sector. Funds generated from the sale of recombining materials (skimmed milk powder and butter-oil) to TDL being allocated specifically to dairy projects. Specific attention was given to dairy development by WFP and the EEC.

#### **(i) WFP Assistance (1975-1995)**

WFP Dairy Aid project (TAN 2247) started in 1975 with a pilot project to supply commodity aid: Skimmed Milk Powder (SMP) and butter-oil to Tanzania for financing of development projects. The function of WFP Food Aid in Dairy Development was to supply milk powder and butter-oil to dairy plants for recombining purposes to increase the availability of milk, but the main objective of WFP assistance was to generate funds from the sales of dairy commodities for further investments in dairy projects aimed at improving milk production, collection and processing facilities.

The programme was not very successful. Funds generated in local currency have been inadequate or wrongly invested in such items as housing estates for workers. The shortage of foreign exchange and imported dairy inputs, continued to jeopardise dairy development in Tanzania. A total of T.shs 3 billion was generated (1979 – 1995) which was used to finance over 169 projects countrywide.

### **2.2.3 EU Assistance**

The EU have been assisting Tanzania by providing milk powder and butter oil for recombining purposes. Funds generated from the proceeds were also supposed to be used for the development of livestock projects. Most of these funds generated were also used to finance other livestock projects, besides dairy projects. The objective of providing milk powder and butter oil to milk plants for recombining purposes to increase the availability of milk in the country has been successful. However, local dairy development by investing the revenues of the programme in the industry, did not succeed as intended.

### **2.2.4 Small Scale Dairy Development in Iringa and Mbeya Regions (1979-2003)**

This dairy project is being implemented in selected districts of Iringa and Mbeya regions. It is funded by both Swiss and Tanzania Governments. The project began in 1978. Farmers were

selected and trained before being given a pregnant dairy heifer from Sao Hill LMU. This was followed by an extension package, which ensured that the farmer was well equipped with knowledge to take care of the animal. The progress in this project is so far encouraging. By 1998 the population of dairy cattle managed in this project were 5,026 with capacity to produce 5.0 m litres of milk per year. A heifer in Trust Scheme is also in operation since 1995. The project is now in the exit phase and is due to end by December 2003. In order to ensure sustainability, farmers networks have been formed at village and district levels in order to manage the credit animals and other services such as milk marketing.

## **2.2.5 The Dutch Funded Projects**

### **2.2.5.1 Kagera Livestock Development Project (KALIDEP) (1982 –2003)**

The project started in 1982 and is funded by both the Dutch and Tanzania Government. The project has three components, heifer breeding at Kikulula HBU, farmers' training centre at Kikulula HBU and an extension package involving a network of farmers extension units located in every Division (de Wolf, 1995; Rugambwa *et al* , 1995). By 1998 the project was serving 2500 dairy farmers. Total milk has increased from 160,000 litres in 1983 to 3,300,000 litres in 1998. There are now (2003) estimated to be more than 7,000 farmers keeping some 16,000 crossbred dairy animals in Kagera<sup>3</sup>. By 2002, Milk production has increased to an estimated 11million litres per annum from the improved herd out of about 25 million litres estimated for the region as a whole.

### **2.2.5.2 The Tanga Smallholder Dairy Development Project (TSDDP) (1985 – 2003)**

This is another project funded by both the Dutch and Tanzania Governments, which began in 1985. The project has also three components, Muruazi Heifer Breeding Unit, the Buhuri Farmers Training Centre and extension services. By 1998, total number of farmers in the project were over 5000 farmers. Annual milk production has increased from about 100,000 litres in 1985 to about 4 million litres in 1998. From 2001 the project was merged with the Kagera Livestock Development Project and is currently managed under the Smallholder Dairy Support Programme (SDSP) which is scheduled to end in 2005. This is being considered as exit phase for the two projects. To ensure sustainability and continued management of the Heifer- in- Trust schemes, farmers' organizations at village and division level are being promoted (SDSP, 2002). In both Kagera and Tanga regional Trusts ( KADADET and TADAT) have been formed to co-ordinate the activities of the projects and to oversee smooth handing over of the projects activities to farmers by year 2005. Hence the main thrust of the TADAT and KADADET, overseen by SDSP is to strengthen farmers' organizations in service delivery and management of HIT schemes (SDSP, 2000a, 2000b).

### **2.2.5.3 Austrian Government**

The Austrian government provided support to small-scale dairy farmers of Dar es Salaam, Mara and Coastal Regions and to pastoralist producers around DSM (Auerbock, 1993). The support has focused mainly on milk marketing through provision of technical assistance and soft loans. In its current form it acts mainly as a service provider rather than an implementing agent. The Austrian government has also provided assistance from 1998 to a national dairy task force that was formed by stakeholders to work towards establishment of an autonomous, Dairy Development Board for Tanzania (TDDB)

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<sup>3</sup> SDSP Technical report: Kagera Jan.2001 – September 2002, pg 5

### 2.2.5.4 Other donor countries and organization

The dairy industry has received assistance from various sources as shown in Table 2 below.

**Table 2: Summary of assistance to dairy development in Tanzania ( 1970 – 2003)**

Organisation/Country	Nature of support
Switzerland	Support to one LMU Sao Hill Iringa region & extension programme for small - holder dairy development in Iringa and Mbeya Regions
New-Zealand	Supply of spare parts for the milk processing plant in Tanga and the Livestock Training Institute in Tengeru, Arusha. Provided Jersey heifers to Tanzania
Sweden	Support to A.I. - NAIC, Arusha. The Centre produced semen, which is being used throughout the country. Currently has 3 Progeny tested bulls imported from South Africa.
Federal Republic of Germany	Assistance to small-holder development in Lushoto; support to regional veterinary service Tanga. Training in ruminant animal production. Gave a Simmental herd of about 200 heifers to Tanzania. Supports dairy development in Kilosa/ Mahenge districts.
Finland	Assistance to milk processing plant in Mbeya. The plant was owned by TDL. It produced short term UHT milk using the Elecster system. Following privatization of TDL in 1995, the plant has been liquidated and its machines sold by pieces to various processors.
Ireland	Support to dairy farm and heifer breeding units at Kilosa, Morogoro Regions.
United Kingdom	The UK for many year supported the Large Scale Dairy Farm & HBU at West Kilimanjaro
HPI	Assisted in Importing Stocks for Small Dairy holders. Establishment of the Heifer in trust scheme through the Heifer Project International (HPI) in almost in all regions in Tanzania.
USA	USAID has made its contribution to the development of small-scale producer with a strong emphasis on training in extension, particularly training in Rural Development Centres throughout Tanzania. It has provided buildings, equipment and transport facilities for small farmers.
Japan (JICA)	Support to pasture seed production and funding of HIT schemes
UNDP/FAO	In the early 1980's UNDP/FAO gave financial and technical support to Smallholder dairy development in Arusha/Kilimanjaro regions. Financed training in dairy development.
Land O'Lakes	Since 1997, Land O'Lakes, a USA dairy Co-operative company has entered and extended support to dairy development in Tanzania through mainly promotion of milk consumption Campaigns. Since then dairy industry stakeholders organise one week milk consumption promotion week in June every year. This has contributed to much awareness by consumers on the benefits of consuming milk. Some training has also been extended to various producer and marketing groups.
Belgium	Support INCOMET/INCOFIN dairy development in Mufindi
SNV	Supports Songea Development Action (SODA) involved in HIT scheme in Songea, Ruvuma District through Dutch Government support
NORAD	Support to the department of Animal science, SUA; Establishment dairy research herd at Animal science department since 1983/84, including a dairy goat unit. Supported introduction dairy goats in Mugeta, Uluguru Mountains, Morogoro
SURUDE	A local NGO supported by Danish Church Aid, UNDP. Introduced smallholder dairy in Tuiriani Division, Morogoro District
DANIDA	Support to the establishment of Faculty of veterinary medicine, SUA for undergraduate and postgraduate studies; Establishment of the Meat and dairy Technology laboratory and pilot Plant at department of Animal Science and Production, SUA
Netherlands	Support to district integrated Development Programmes- including dairy in Kondoa, Mbulu, Maswa etc.
Farm Africa	Support Dairy goat development in Babati District
ODA/RISPS	Support to dairy Goat Development in Lindi /Mtwara regions since early 80s
DFID	Financed research work in dairy- Mwanza/ Morogoro/ dar Es Salaam
ILRI	Carried out rapid appraisal for the dairy industry, financed by the Swiss development co-operation; Also carried collaborative research on dairy marketing and public health with SUA. Financed by DFID
FAO/DANIDA	Support to regional training programme at Naivasha Kenya, early 80s. A number of Tanzania were trained there.
UNICEF	Supported dairy technology unit at LITI tengeru in mid 70s
NORDIC Countries	Supported dairy technology Unit at Uyole Agricultural Centre/MATI Uyole

### 3. Milk marketing and processing

#### 3.1 History of organised milk marketing and processing

Most of the milk produced in the country is consumed at the farm level or sold to neighbours. The government's policy is, however, to attempt to channel surplus milk to dairy plants for commercial processing, with a view to supplying urban markets with hygienic milk and milk products.

In the past, rural milk collection was organised by the processing plants. A network of collection routes, on the village feeder roads, was established by each plant. On these routes, collection centres equipped with cooling facilities were provided and operated by Tanzania Dairies Limited (TDL). In addition, a number of producers delivered their milk directly to the processing plants, earning a collection/transport margin.

At that time, seven processing plants owned by TDL were processing milk. However, the ability of TDL to collect and process raw milk was very low and with ageing of plant machinery and milk collection infrastructure, the capacity to collect and process raw milk declined drastically over time. The effectiveness of milk collection depended on the availability of adequate transport, road conditions and the operation of milk cooling centres. Due to the ageing of machinery, poor maintenance, frequent breakdown of vehicles and unattractive official producer prices, less milk was collected by the plants leading to low capacity utilisation of the established dairy plants.

The share of local fresh milk processed by TDL reached its highest level in 1979, at 14,307,867 litres (35.64%) out of a total of 40,150,942 litres processed (Lohay 1988). TDL relied heavily on the recombining of World Food Programme (WFP) milk powder and butter oil. Figure 1 shows the volumes of both fresh and recombined milk handled by the Dar es Salaam TDL plant from 1976 to 1994 when dairy commodity aid came to an end. The seven TDL plants had a total processing capacity of 309,000 litres per day but actual production never exceeded 30%.

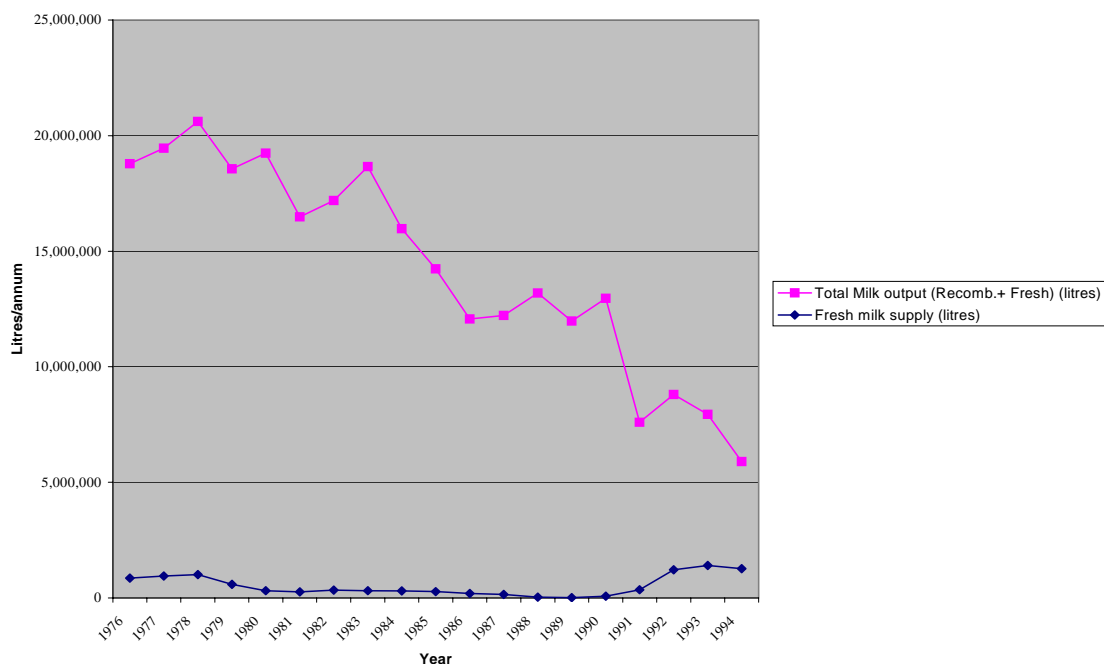


Figure 1. Performance of the Dar es Salaam TDL dairy plant in processing of reconstituted and local fresh milk (1976–94).  
Note: the Dar es Salaam plant handled >60% of all imported



## **4. Lessons learnt from past and on-going interventions**

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Even though more than 40 years of dairy development has not brought spectacular achievements as has been witnessed in operation flood in India, positive improvements have been made, especially since the mid 1980s when emphasis changed from large scale government farms to small holder dairy development.

### **4.1 Use of dairy commodity aid.**

Funds generated from the sale of dairy commodity aid (WFP and EU) were put to various uses but the most evidently useful output has been the support to Heifer Breeding Units/Livestock Multiplication units and in farmer training. This has contributed to establishment of a genetic resource base and skills for the future growth of the dairy industry. It is noteworthy that the availability of food commodity aid did not encourage the local industries to put up infrastructure to procure local milk!. This was because imported milk powder tended to be cheaper and of course more convenient to handle.

### **4.2 Dairy herd growth and breeding**

Under small holder farmers, a herd growth of 6% per annum has been achieved. This is attributed to close monitoring, farmer training and extension services which were subsidised by donor funded dairy development projects. Under the current move to privatise most services, the challenging question is how to internalise some costs such as extension services, training, control of epidemic diseases such as CBPP and delivery of AI services which seem to have elements of public good and the cost of which may well be beyond the reach of smallholder farmers at least in the short term. A gradual and selective scaling down of donor/government subsidies is considered to be the only logical approach if loss of advances already made is to be avoided. This requires that farmer groups are strengthened before such services can be offloaded to them. However, the dairy herd has grown from 142,000 (1984) to about 500,000 animals in 2002 (Boki, personal communication)

### **4.3 Heifer- in- trust schemes**

The heifer in trust scheme, although requiring a lot of organisation, commitment, coherence and discipline on part of the recipients, it has proved to be useful tool in reaching out to resource poor farmers in rural areas. The associated subsidy element can be quite high (40% of the cost price of milk) and the challenge in the future is how to internalise a substantial part of the costs. The Swiss funded Small holder dairy development project in the Southern highlands now in its 9<sup>th</sup> and final exit phase, has embraced an exit strategy that hopes to empower farmer group networks (in terms of organisation capability) to run the HIT schemes in the future. The SDSP is attempting to do the same in Tanga and Kagera (SDSP, 2002)

### **4.4 Milk processing and marketing**

As was the case with production activities, milk processing and marketing by government agents did not work efficiently in Tanzania. The emerging private sector is struggling against (unfair) competition from the informal sector. Quality assurance systems are weak or absent and competition from imports is mainly on the basis of quality differences rather than price. Improvements in processing and quality assurance and efficiency is necessary for survival in an increasingly liberalised, global market. This will require self regulation rather than control from government. This implies the industry will have to organise itself to better face the challenges of today and tomorrow. Although private sector participation has expanded the processing capacity

from 309,000 litres/day to 500,000 litres per day, recent closures of about 5 plants out of 10 processing plants needs further scrutiny as to the reasons behind these insolvencies.

#### **4.5 Institutional setup and farmer organisations**

Parastatal dairy farming and processing proved to be a complete failure. The experience in Tanzania has demonstrated that it is the private farmer who can make good farmers. At the smallholder sector level, dairying clearly benefits women and is a strong tool for poverty reduction. The future lies with the private sector. However, without co-operation smallholder farmers, cannot sustainably carry out dairying as business. Hence there is need to establish stakeholder based associations/ co-operatives on the principle of shared goals and objectives.

## 5. The Evolution of Dairy Policy

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For a good part of the last 30 years, the government tried to do everything, from dairy farming to managing milk processing factories. In the mid 70's, a shift of emphasis towards the smallholder private farmers emerged. Various bilateral development programmes ensued. The major players in the past 20 –25 years have included:

- Southern Highlands Dairy Dev. Prog. (1978 to date)
- Kagera Livestock Dev. Prog. (KALIDEP, 1982 to date)
- Tanga Dairy Dev. Prog. (TDDP, 1984 - to date)
- Heifer Project Intern.- H.I.T.Schemes (1980's to date)
- Austroproject Association 1993 to date
- Land O'Lakes smallholder Co-operative dairy business promotion programme, 1996 to date
- Ministry of Agriculture and Co-operatives
- Private milk processor and marketing agents

A policy shift towards the private sector involvement was anchored by the government in its 1997 Agricultural policy (MAC, 1997; Melewas, 1996)

During the 2<sup>nd</sup> dairy development conference held in Arusha in 1998, the stakeholders realized that the dairy industry was disorganized and highly unregulated. At the same time a number of issues were adversely affecting the performance of the industry. Foremost among these was the withdrawal of government in provision of extension services, AI, essential veterinary services like dipping against ticks; weak milk collection and marketing infrastructure, numerous and high tariffs and taxes on milk production inputs such as land tax, tax (VAT) on packaging materials, electricity tariffs etc. The Dairy Board which was government controlled had ceased to function since 1973 and the Dairy industry Act Cap 590 of 1965 was moribund and irrelevant under a market led economy of the late 20<sup>st</sup> century. They resolved to set up a task force that would work towards establishment of an Autonomous dairy industry stakeholder organization, funded and controlled by the stakeholders. The task force was charged with:

- a) Reviewing the dairy industry policy, laws and regulations
- b) Sensitisation of stakeholders to form grassroots' organizations that would form a basis for formation of district, regional and national level organizations.
- c) Development of a dairy development master plan / investment plan to guide the development of the dairy industry.

The 1997 Agriculture Policy document provides for the need to form the Boards for the dairy and meat industry. The task force has refined the broad policy objectives by defining the various dairy industry stakeholders and their functional roles as follows:

- **Government-** this includes KILIMO (Now Ministry of Water and Livestock Development (MWLD)) and other Government Ministries and institutions such as Tanzania Bureau of Standards (TBS), the National Food Control Commission (NFCC)
- **Farmers (producers)-** these include dairy farmers, farmer groups and co-operatives and such other organisations at village/district/zonal or national level. Their function is as follows:
  - Representing, promoting and lobbying for farmers' interests
  - Enabling farmers to take advantage of economies of scale

- Enabling farmers to source inputs and market their produce efficiently, including establishment of farm supply stores at convenient locations and availing credit lines for their members
- Establishing banking and credit facilities for members
- Sourcing new technologies for farmers (research and extension)
- Contributing to policy initiatives on behalf of the farmers
- Affiliating to District/Regional/Zonal/National and International organisations/groups with similar interests on behalf of and for the benefit of their members
- **Milk processors-** those with capacity to pasteurise and to add value on raw milk by producing other products such as cheese, ghee etc. Their functions are as follows:
  - Ensuring quality processed milk and milk products in the market at reasonable cost.
  - Creating demand for their products through market promotions
  - Responding to consumer demand
  - Contributing to dairy research
  - Undertake innovative introduction of new dairy products in the market and promotion of their consumption
  - Creating healthy competition in the market
  - Participating in dairy policy formulation
  - Contribute to dairy industry sustainability through efficient processing
- **Input suppliers-** these include suppliers of veterinary drugs, feeds, equipments etc
- **Donors and NGOs-** this group will be limited to those who are involved in the dairy industry
- **Milk traders-** this group includes wholesalers, retailers, (Informal) raw milk traders (vendors and hawkers) etc.
- **Consumers-** this group includes individual consumers and any consumer organization
- **Proposed Autonomous Dairy Development Board/Association or Platform**
  - Dairy industry quality assurance
  - Overall development of the dairy industry
  - In collaboration with MWLD, initiate dairy industry reviews
  - In collaboration with MWLD, manage dairy industry information system
  - Ensure that it is a dairy industry stakeholders' agent, not master, and make sure it represents their interests in all undertakings
  - Monitoring of import and export of milk and milk products
  - Support the dairy industry development through positive interventions, such as offering training when and if necessary

After several years of the work of the task force a draft dairy bill with provisions to establish and a democratic, autonomous dairy development board was approved by the first ever general assembly of dairy industry stakeholder when they met during the 3<sup>rd</sup> dairy development conference held in Arusha, June 2001. An interim dairy development board with the following representation was elected by over 120 district representatives in accordance with section 12 of the draft Bill<sup>4</sup>:

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<sup>4</sup> 12 (1) The Board of Directors of the National Dairy Development Board shall be elected by the General Assembly and shall include the following members:

- (i) The Chairperson of the Board
- (ii) Executive Secretary
- (iii) Members representing stakeholders in accordance to the following proportion:
  - a. Milk Producers – 5 members
  - b. Dairy Processors - 2 members
  - c. Milk Traders- One member

The General assembly serves as the annual general meeting and is the highest decision making body with the following functions and representation:

The functions of the GA<sup>5</sup> are to:

- (i) Serve as the General Assembly of the registered stakeholders, hereinafter referred to as the GA;
- (ii) Promote the development of a sustainable dairy industry in Tanzania;
- (iii) Advise the Minister and the Board on issues concerning the dairy industry and on matters arising from the implementation and operation of this Act, and on progress towards achieving its objectives;
- (iv) Monitor and evaluate the performance of the Board;
- (v) Elect members to the Board;
- (vi) Carry out any other function assigned to it under the Act or as may deemed necessary for effective implementation of the Act.

The draft dairy industry bill, is expected to be enacted during the second half of 2003/04.

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- d. Dairy Input Suppliers - One member
  - e. Milk Consumers - One member

(2) The Board also shall include one ex-officio representative from the following Public institutions:

- a. The Ministry
- b. Government Institution responsible for Food Quality Control
- c. Government Institution responsible for Standards
- d. University of Agriculture
- e. Ministry responsible for Local Government & Regional Administration
- f. Ministry of Finance

3) The Chairperson of the Board shall be elected from amongst the Board Members other than ex-officio members.

(4) Ex-officio members of the Board shall be appointed by the Minister on recommendation of the public institutions they are to represent.

- 13. (1) A member of the Board shall hold office for a term of three years, and shall be eligible for re-election.

(2) Notwithstanding the provision of subsection (1) of this section a member's tenure of office shall not exceed two consecutive terms

<sup>5</sup> (1) The GA shall consist of the following members:

- (i) The Minister or his nominee, who shall be the first Chairperson of the GA at the first Annual General Assembly Meeting
- (ii) Representatives of registered stakeholder organizations of every district representing:
  - (iii) Four representatives from registered National milk processors' organizations
  - (iv) Four representatives from registered National dairy farmers' organizations
  - (v) Four representatives from registered National milk consumers' organizations
  - (vi) One representative appointed from the following public institutions:
    - a. The Ministry
    - b. Government Institution responsible for Food Quality Control
    - c. Government Institution responsible for Standards
    - d. University of Agriculture
    - e. Ministry responsible for Local Government and Regional Administration
- (vii) Representatives of Non-governmental Organizations active in the dairy industry development

(2) Upon recommendation by the GA, the Minister may vary the number of representatives to the GA.

(3) Except for the first Chairperson of the first annual meeting, the GA shall appoint the subsequent Chairpersons.

(4) The Chairperson shall hold office for the period of four years and may be re-elected for a second term. No member shall hold office for more than two consecutive terms.

## 6. Dairy production systems

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A rapid appraisal study identified five dairy production systems that have evolved in Tanzania over time (MoAC/SUA/ILRI 1998). These are:

- i) Smallholder dairy farming, integrated with perennial crops like banana and coffee, found in the northern regions (Kilimanjaro/Arusha), Kagera Region in the north-west and the southern highlands of Tanzania.
- ii) Smallholder dairy farming integrated with annual crops like maize and cereals found in the central part of Tanzania.
- iii) Specialised medium-scale dairy farms found near big urban centres such as Dar es Salaam, Tanga, Mwanza and Musoma. On these farms with 10 to 50 cows, milk production is the main economic activity. There is little crop cultivation and a limited level of mechanisation.
- iv) Peri-urban dairy is found in the coastal belt, mainly near Dar es Salaam, Tanga, Morogoro and other urban centres where many civil servants and businessmen have taken up dairying as a means of generating additional income.
- v) The traditional, semi-sedentary system, which accounts for 75% of total milk production. However, this sector is relatively forgotten in dairy development policies, which generally aim at the crossbred cattle dairy farming. 'Because of its size, this sub-sector represents the biggest potential for increasing milk production in Tanzania, yet very little effort has been directed at improving milk offtake from this sub sector' (Kurwijila *et al*, 1996. Kurwijila *et al*. 1997. The Austroproject Association is one of the exceptions, being an organisation that supports this group of mainly Maasai herders, in collecting and marketing their milk.
- vi) Parastatal large-scale dairy farms. The government through the dairy farming company (DAFCO), operated at least 7 dairy farms with a total of over 3000 dairy cattle. In spite of having the best dairy animals in the country, the performance of the DAFCO farms did not measure up to expectations due to a number of management problems. Milk production declined from 7.5 litres/cow per day in 1982 to 6.7 litres/cow per day in 1994 (Keregero 1988; Mtumwa and Mwashia 1995). Most of these farms have been privatised or are in the process of being privatised.

### 6.2 Animal health services delivery systems

Until recently, the delivery of animal health services was embedded in the agriculture extension system with the government paying for cost of extension personnel, transport and some drugs, especially those used for tick control. Following market liberalisation in the mid- 1980s, the veterinary service has been increasingly run by the private sector. The government still pays the salaries of extension veterinary staff, and meets the costs of disease surveillance and vaccinations against epidemic and transboundary diseases such as CBPP (contagious bovine pleuropneumonia) and rinderpest. Due to the poor infrastructure of the animal health delivery system, especially in rural areas, the use of para-veterinary staff is encouraged, but not yet regularised.

Related to this is delivery of artificial insemination (AI) and breeding services. The government runs a national AI centre at Usa River in Arusha but the service has not been very efficient with about

15,000 inseminations (30,000 doses) being recorded in recent years (Boki, personal communications). Fully privatised veterinary and AI services are still confined to very few urban and peri-urban centres where farmers are accessible and able to pay for the services. Government policy is to move towards a private sector serviced and government regulated animal health delivery system within the next 10–15 years.

### 6.3 Efficiency and economics of milk production

The competitiveness of any dairy industry depends on the efficiency with which milk is produced. This may be measured in biological terms such as calving intervals, feed conversion efficiency and milk production/cow per day, which translate into cost of production per litre. Smallholder production reveals a similar trend to that shown by data from the Tanga Smallholder Dairy Development Programme (Msanga *et al.* 2001;(see Table 3). The general decline in performance of both first lactation heifers and multiparous cows is a reflection of reduction in use of several essential inputs (feeding, veterinary services etc) and extension services as the number of farmers and cows increases in the dairy development programme.

The cost of production varies depending on the production system. It is reported to be lower in the rural based traditional system, where milk fetches as little as 80 Tanzanian shillings (TSh) per litre (US\$ 1 = TSh 1000 , March. 2003), than in urban and peri-urban areas where milk production costs have been estimated to be in the range of T.Sh 165–200/litre (de Wolf, 1999). In the southern highlands, smallholder dairy farmers are reportedly producing milk at T.Sh 60–80/litre (Mugittu 1999). The value of dairying extends beyond milk sales (Mwakyembe, 1996a, 1996b). Manure and heifers are particularly important outputs of the enterprise, especially in the zero grazing systems of the Kagera and Kilimanjaro coffee/banana economy where manure is ranked second after milk (Silas *et al.* 1998).

Table 3. *Milk production trend under Tanga Smallholder Development Programme (1990–95).*

Year	Number of cows	LS means* first lactation yield (SE)	LS means repeated lactation yield (SE)
1990	99	2084 (79)	1993 (132.1)
1991	167	1996 (63.5)	1881 (93.1)
1992	248	1904 (56.2)	1952 (80.8)
1993	74	1668 (87.0)	2178 (115.3)
1994	120	1358 (71.4)	1774 (106.1)

\* *LS means = least squares means; SE = standard error.*

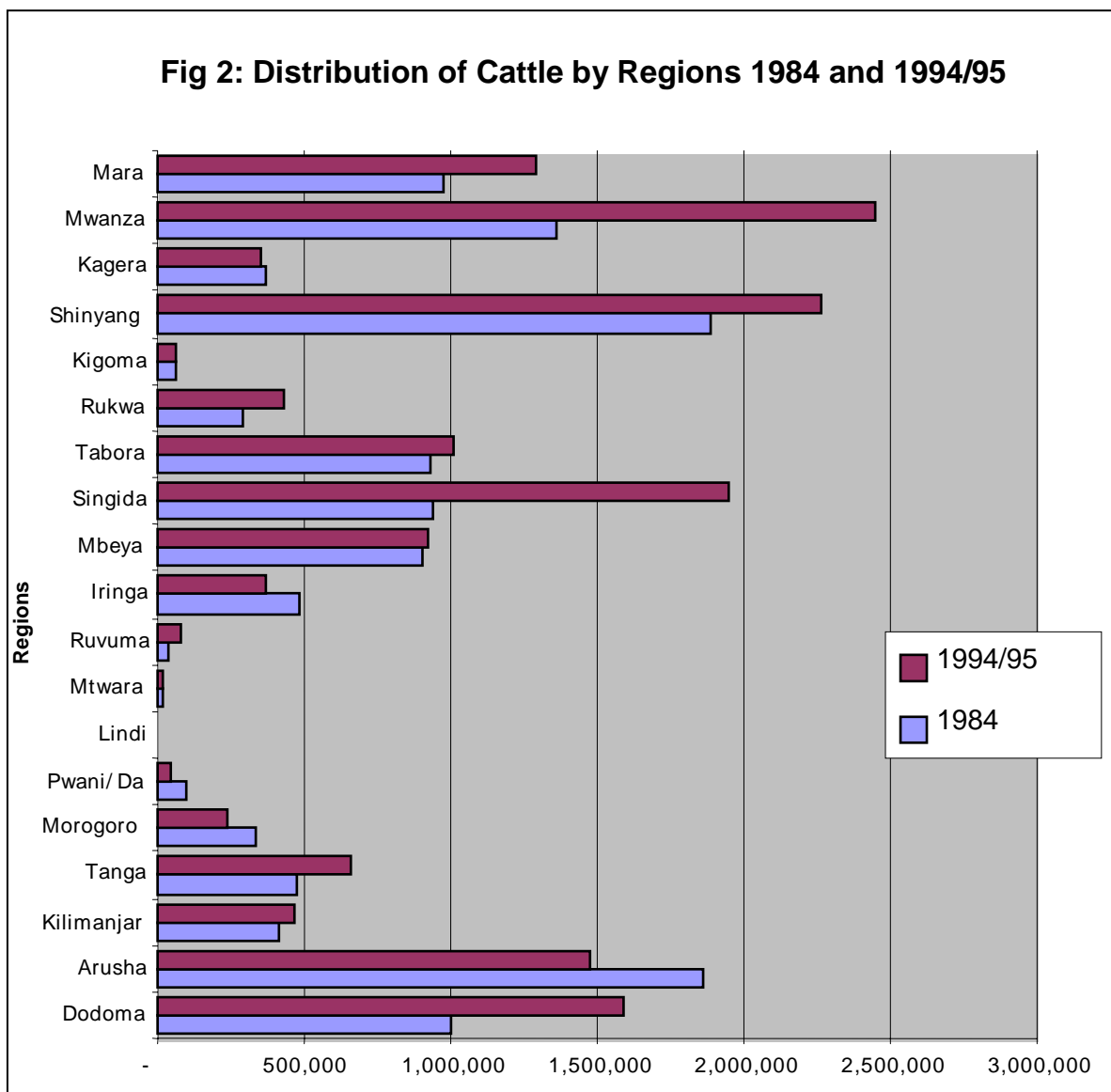
*Adapted from Msanga et al. (2001).*

### 6.4 Milk production, supply and demand

Improvements in milk supply in Tanzania have largely been due to increases in cattle numbers rather than increases in productivity (see Table 3). The number of indigenous cattle increased by 20% between 1984 and 1997. The number of crossbred dairy cattle increased from 142 thousand to 250 thousand over the same period (an increase of 6% per annum)and is estimated to be about 450,000 in 2000.. Although the improved dairy herd has grown at a rate of 6%, this has not had a big impact on per capita consumption because the dairy herd is still a very small proportion of the total herd. The relative growth rate in urban and peri-urban areas during the same period is reported to have been much higher. In Dar es Salaam for example, the number of dairy cattle increased from about 2000 in 1984 to over 20 thousand by 1995. The spatial distribution of milk

supply is skewed in favour of regions with high zebu and/or dairy cattle populations, such as Kilimanjaro, Arusha, Dar es Salaam/Coast, Mara, Mwanza, Kagera, Singida and the major urban centres (Fig. 2 and Fig. 3). This is associated with much higher levels of per capita milk consumption in urban centres (30 litre/annum) than in rural areas (15–20 litres/annum).

It was estimated that by 1998 the traditional livestock sector was producing about 438 million litres of milk per year, while the commercial sector produced 250 million litres of milk. Though the offtake from the dairy herd contributes only about 20% of total milk production, it is estimated that it contributes 95% of the marketed milk. Over the last two decades, total milk production has increased at the relatively low rate of about 2.8% per annum, i.e. the same rate as population growth. Therefore, despite the large number of cattle in Tanzania, production of milk and milk products does not satisfy the demand, particularly in the urban centres.





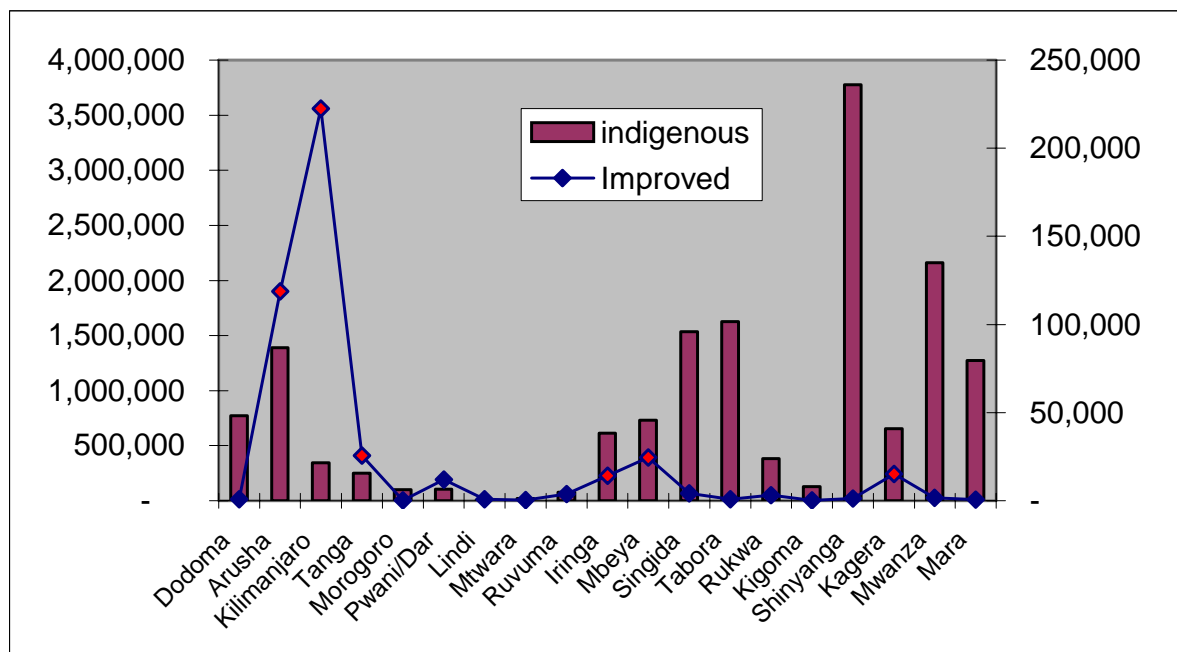


Fig.3 Dairy and Traditional Cattle distribution by Regions 1998/99

**Table 4.** Milk production and consumption trends in Tanzania 1970 –98.

Year	Population (x10 <sup>6</sup> )	Milk production (x10 <sup>6</sup> kg)	Per capita consumption (kg)
1970	13.3	302	22.9
1980	17.5	391	22.1
1985	21.7	436	20.1
1990	25.9	500	19.3
1995	28.1	585	21.0
1997	30.2	675	22.4
1998	31.1	687	22.1
2002	34.0?	900	26.4

Source: MALDC—budget speech—1997–98 to 1998–99 ; 2002 Human population census, Bureau of Statistics, 2003

Tanzania's per capita milk supply of 23 litres/annum is one of the lowest in sub-Saharan Africa. This is partly due to the predominance of the low milk producing zebu cattle (with yields of about 200 kg/annum) and a relatively small improved dairy herd producing below potential (with yields of about 1800 litres/cow per annum versus potential yields of 2500 litres/cow per annum), lack of milk marketing infrastructure, low purchasing power and the cultural food consumption habits of consumers.

According to the MoAC/SUA/ILRI (1998) study estimates, milk demand projections to the year 2010

(based on current consumption levels, urbanisation levels of 5% per annum, a population growth of 2.3% per annum, an overall income elasticity for dairy products of 0.8 and a modest real GDP growth of 1% per annum) indicate that demand could increase by 60% to 1.5 billion litres of milk annually (see Figure 4) or a per capita consumption of 44 and 30 litres/annum, respectively, in urban and rural areas.

Milk production (under the following assumptions: no change in current cattle herd productivity and structure; an increase in zebu cattle population of 1.7% per annum and a dairy herd expansion of 4.6% per annum) would increase milk supply by 43% to 1.33 billion litres/annum resulting in a shortfall of some 170 million litres/annum (466 thousand litres/day). Milk production would have to increase at the rate of 3% per annum to keep pace with demand. Should the economic performance of the economy improve by 2% GDP or more, the gap between supply and demand will be even greater, signifying an opportunity for smallholder dairy producers to use dairying as an attractive avenue for poverty alleviation. Policy guidelines are required to enable farmers to fully exploit this potential opportunity.

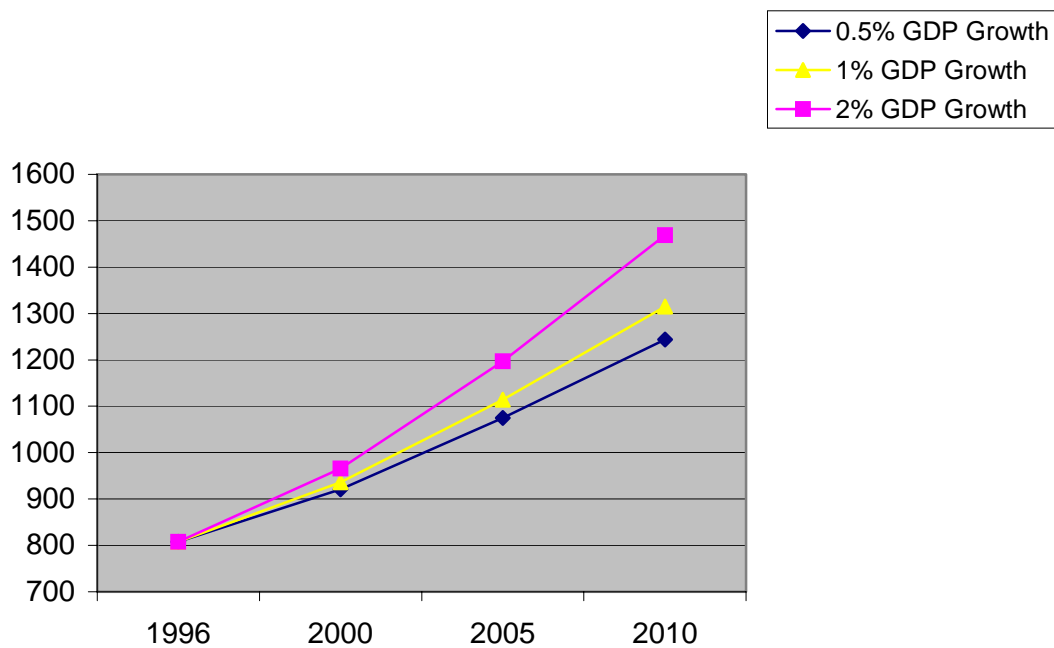


Fig. 4: Milk demand projections for Tanzania to the year 2010. Source: MoAC/SUA/ILRI,

## 7. Current milk marketing and processing

The marketing policy has undergone significant changes as part of the overall process of structural adjustment. The marketing of milk and milk products in the formal sector was previously done by TDL, but most of the milk produced was sold directly to consumers. After liberalisation and privatisation of TDL, the private sector has been investing in collection, processing and marketing. This has resulted in improved availability of milk in urban centres and better prices for the producers, although consumer prices remain high.

Some parastatal organisations and private companies have established other small processing units. This has improved the total processing capacity from 309 thousand litres/day under TDL to the current level of 500 thousand litres/day (Fig 5). However, the total daily intake is only about 80,000 to 90,000 litres/day. During the dry season, milk intake from local sources decreases by as much as 30% or more especially milk from the traditional cattle herds which depend purely on natural pastures (Fig 6 and Fig. 7). Fig. 6 showing milk collection at Milk collection centres collecting milk from traditional cattle herds in the Dar es Salaam-Coast-Morogoro milk shed area illustrates this point very well. Some processors in Dar es Salaam use imported milk powder to fill the gap.

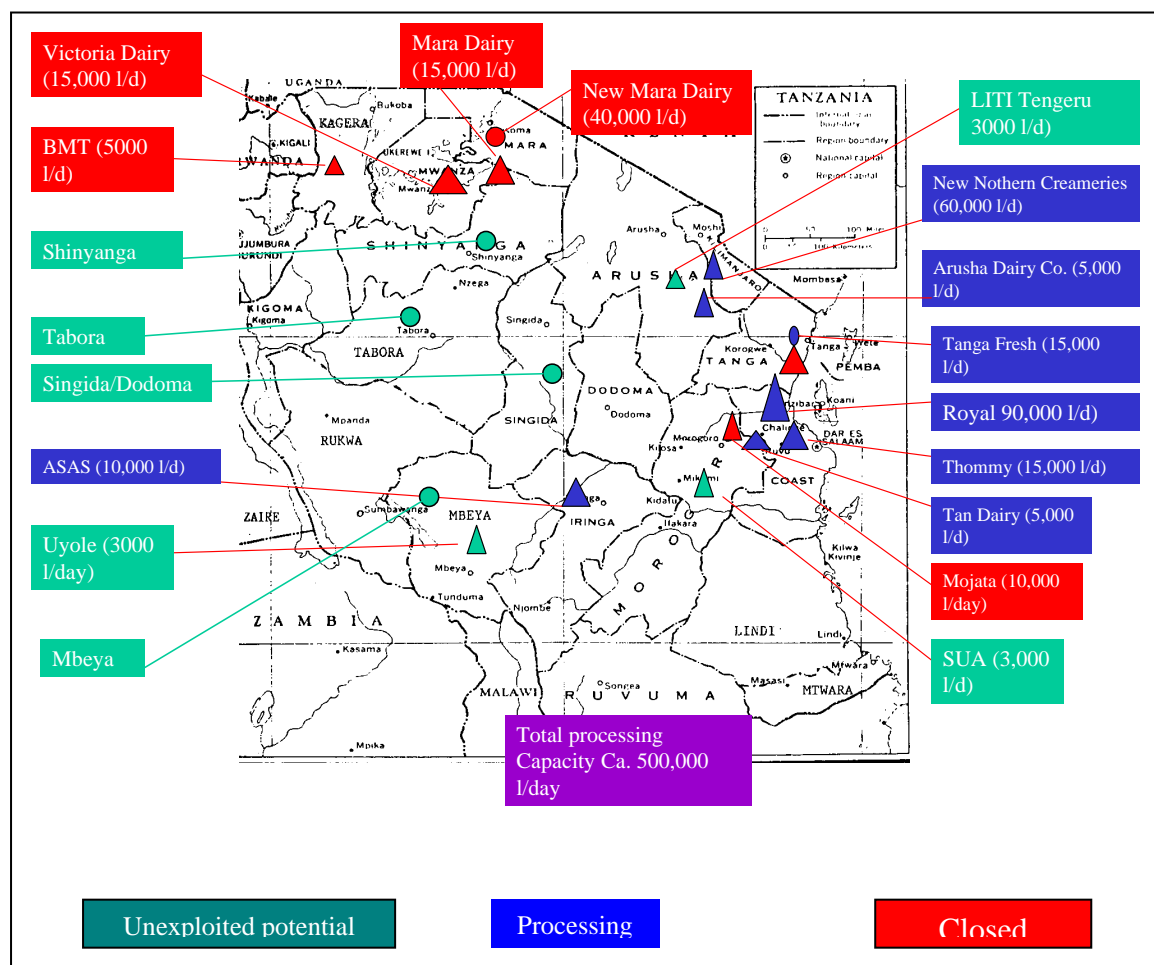
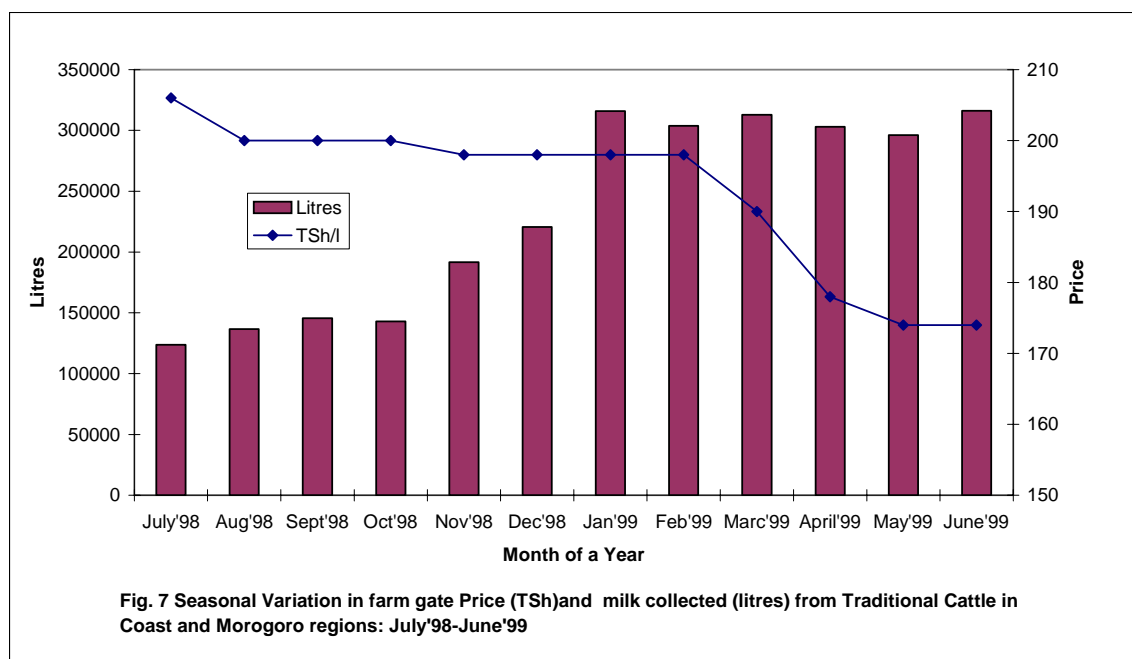
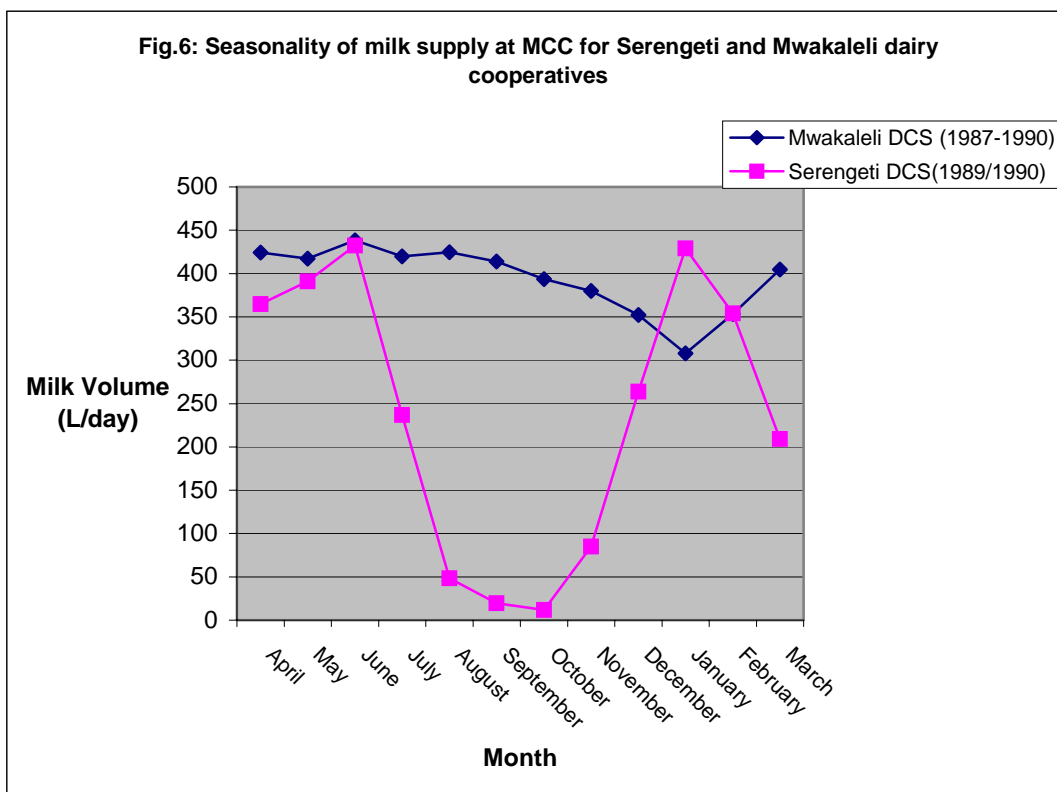


Fig. 5: Distribution of functional and non functional milk processing plants in Tanzania



Source: Austroproject records (2000)

In spite of these positive developments, the marketing of milk is still dominated by informal milk marketing. It has been reported that less than 10% of milk produced in the country is marketed as processed milk and milk products. The market is highly fragmented. High milk producing areas are situated far away from milk centres in the major urban centres. The range of dairy products on the market is still very limited. Over 90% of the milk marketed informally is sold as raw milk by informal market intermediaries with all the attendant health risks (MoAC/SUA/ILRI, 1998). In some towns like Mwanza, Tabora and Shinyanga, itinerant milk vendors supply nearly all the fresh milk consumed (Sumberg, 1996; Stewart, 2000; SUA/ILRI 2000).

## 7.2 Milk imports

During the 1970s and 1980s Tanzania enjoyed food commodity aid from the WFP, the EU and other bilateral sources. The largest amount of recombined milk received in a year was about 35 million litres of liquid milk equivalent (LME) in 1983 (Lohay, 1988) which declined to about 7 million litres LME in 1993. The WFP/EU dairy commodity aid stopped in 1995. Since then milk imports have declined somewhat. In 1999, the Netherlands Economic Institute (NEI) estimated that 5 million litres LME of recombined milk were imported into Tanzania (NEI, 1999). A recent detailed study of the Tanzania Revenue Authority's data on dairy imports into Tanzania has shown that total milk imports between 1995 and 1998 amounted to 109,611,626 litres LME, equivalent to 27,402,906 litres LME per annum (Verwer, 1999). This figure is similar to the TDL total import of 27,968,405 litres in 1985. It appears therefore that in response to the market forces prevailing in Tanzania, other importers have moved in to fill the gap left by WFP/EU commodity aid. Currently imports come in through non-governmental organisations (NGOs) and religious organisations, and in the form of emergency relief aid from the EU's European Commission Humanitarian Office (Verwer, 1999).

The official government policy is to allow milk imports as long as proper taxes are paid. Recent outcries from the private milk-processing sector have forced the government to review this policy with a view to reviewing tax regimes vis-à-vis subsidised milk imports, to protect the local industry against dumping. The current tax regime is as follows: Suspended duty, 20%; Import duty 15%; VAT, 20% making a total of 55%.

Figure 8 illustrates the flow of milk in the Tanzanian market from various sources according to estimates by ILRI, 1998.. It is clear that the informal sector accounts for about 2/3 of the marketed milk or 98 % of milk produced in the country.

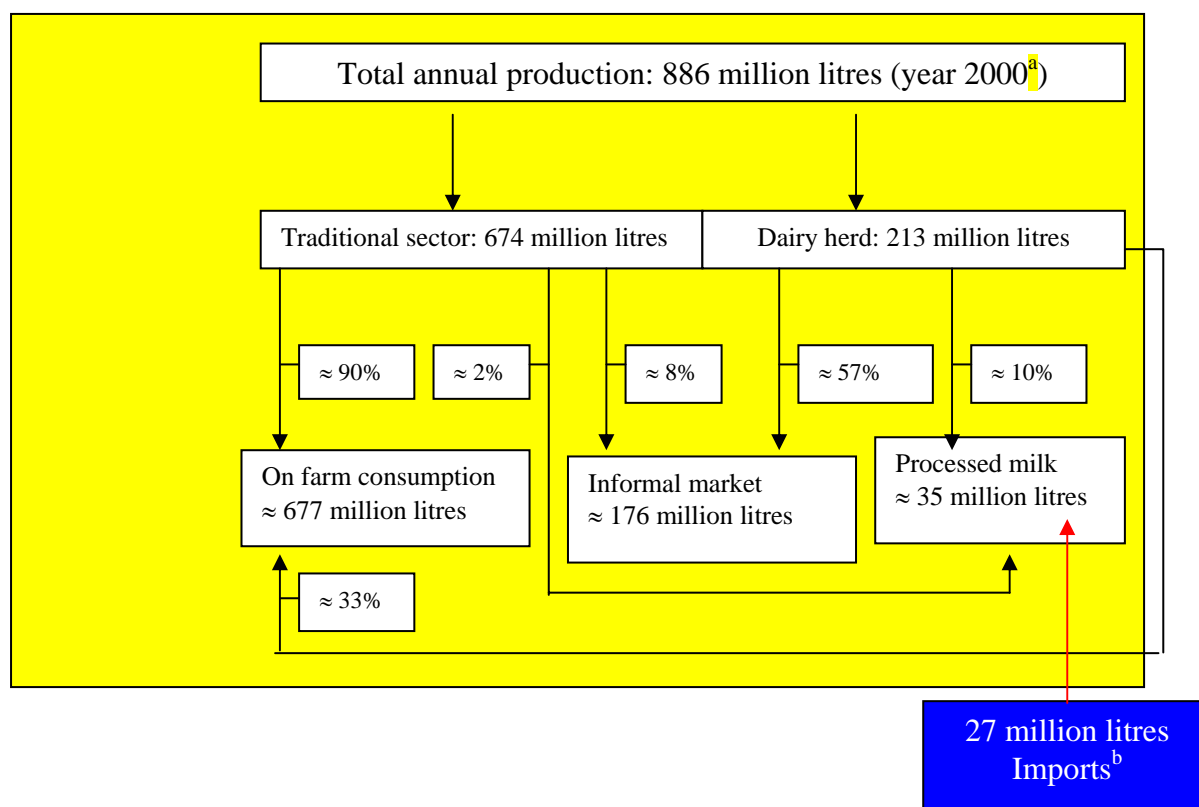


Figure 8. The flow of milk in the Tanzanian market. Source: MoAC/SUA/IRLI 1998; Verwer 1999 .(imports).

## 8. Post-harvest losses in small-scale dairy sector

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Generally, milk production in Tanzania is highly seasonal especially in the traditional sector where grazing on natural pasture and rangeland is the main source of feed for cattle. In the dry season milk production can be 1/3 of what is produced during the dry season ( Kurwijila, 1995) . In small holder dairy production systems practicing zero grazing, the seasonal variation are some what smaller. Data on milk collection at milk collection centers located in an extensive traditional cattle zone and a smallholder, zero grazing, intensive production system illustrate this point. Data from a large scale farm located in the same zone as the Milk Cooling Centres located in the traditional cattle zone shows the beneficial effect of supplementary feeding on season variation in milk production.

Due to poor milk collection and marketing infrastructure, milk surpluses produced in different localities in the country do not reach the market. Hence outcries of farmers pouring away milk (in practice means milk given away free, or taken back home to be consumed, or simply left to be consumed by the calf by not milking the cow) often read in newspapers, imply post harvest loss in terms of “**foregone income**” that would have accrued to the farmer had the milk been sold for cash or in kind. Actual evaluation of post harvest losses have not been carried out. A limited survey of 27 milk bulking groups carried out by Ryoba et al, 2000, showed that during the dry season 4% of an average of 994 litres received/day at milk collection centers was rejected compared to 3% of an average of 1395 litres/day during the flush season. However, estimates show that 30-40% of milk is lost due to either not being milked, adulterated or of poor quality and therefore rejected by consumers/processors, failure to market due to poor marketing infrastructure.

Other forms of post harvest losses include spoilage of processed products such as cheese. The Figure 9 below shows a scene at one small scale cheese processing unit encountered in November 2002, at Kikulula ranch, in Kagera region. Due to marketing problems, the owner had to throw away over 800 kg of cheese valued at 2.5 million shilling. This a huge economic loss to a small scale processor and she had to close the business because of this loss.



*Fig 9: A batch of spoiled cheese seen recently (November 2002) at Kikulula Ranch Cheese processing unit operated by a woman entrepreneur*

Other forms of milk loss include rejection of milk by consumers, milk processors or regulatory agencies due to quality deterioration or adulterations as was witnessed recently in Mwanza, where milk vendors regularly adulterate milk ( Kurwijila *et al*, 2001) (see Fig.10)



*Fig. 10: A health officer in Mwanza supervising disposal of adulterated milk by a milk vendor*

## 9. Consumption patterns and consumer preferences

Milk consumption patterns and preferences has been a subject of study in Tanzania since 1995 ( Austroproject Association, 1995; Mullins, 1995; Mrema et al, 1995). The Austroproject study (1995) and a study by Mullins (1995) were the first to show consumer preference for various milk and milk products in Tanzania. Both studies showed that up to 80% of consumers in Dar es Salaam purchased milk in the form of raw milk. Pasteurised milk was less frequently consumed than expected, presumably because of its perishability in a situation where most low income consumers do not own refrigerators and the relative high cost. Table 5 shows the results of the Austroproject study along with those by Mullins (1995).

**Table 5: Percentages of households consuming various dairy products in Dar es Salaam**

Dairy Product	Austroproject (1995) Percentage (N=120)	Mullins (1995) Percentage (N=79)
Raw milk	79.2	51
Fermented milk	40.0	26
UHT milk (imported)	24.2	3
Butter	19.2	11
Powder milk (imported)	15.0	19
Infant formula (imported)	10.0	-
Condensed/evaporated milk	4.2	-
Pasteurised milk	3.3	36
Yoghurt	2.5	7
Ghee	0.8	8
Cheese	0.8	7
Ice cream	0.8	4
Other dairy products	0.8	2

The results of both studies confirm that raw milk is the most consumed (purchased) dairy product followed by fermented milk and powder milk. Mullins (1995) study conducted 1n December 1994 showed a higher frequency for pasteurized milk (36%) than the Austroproject study (3.3%) conducted October 1995 apparently because of the different localities studied. Apart from these studies there is no data available on the total quantities of various dairy products produced and consumed in Tanzania. Until a systematic data reporting system is in place such information will remain difficult to find. Generally milk consumption in Tanzania is low and higher in areas with high cattle numbers. In specific locations and during specific period of the year, there is apparent low demand for milk and farmers and/or processors may complain of lack of markets for their produce. This is particularly so during the rainy season.

In order to promote milk consumption, the dairy industry stakeholders have, since 1997 been celebrating a milk promotion week in early June of every year. Recently, the promotion of school milk programmes has also been pursued in Arusha and Kilimanjaro in order to create a milk drinking habit among children and youths ( Ngasamiakwi and Kishenkya, 2003).



## 10. Milk marketing and public health risks

During 1999-2001, scientists at the Sokoine of Agriculture, in collaboration with scientist at ILRI, carried out a milk marketing study that looked at the economics and public health issues of the dominant informal milk market in Tanzania with special reference to the Dar es salaam and Mwanza milk shed areas. Results from this study showed the following:

Table 6: Quality of milk in informal markets of Mwanza and Dar es salaam

Product	Parameter	Situation/result
	Dairy Training (hygiene)	90% of market players never received any training
	Hygiene of premises	Mostly unsatisfactory, worse in Mwanza than in Dar es salaam
<b>Raw milk quality</b>		
	Adulteration	14% of milk samples in Dar and 56% in Mwanza
	Coliforms	46% and 67% of raw milk in Dar and Mwanza above 50,000c.f.u./mL
	E.Coli (fecal coliform)	
	Drug Residues	35% and 40% of milk sampled in Dar Es Salaam and Mwanza drug residues above EU limits
	Peroxide test	9% of the milk marketed as raw milk was actually pre-boiled milk
<b>Boiled milk quality</b>		
Served hot	coliforms :<1 c.f.u/ml	64% of milk samples met the standard
Served chilled	coliforms :<1 c.f.u/ml	Only 30% of milk samples met the standard
	Peroxide test	23% of samples positive for peroxide test (under-boiled)
<b>Fermented milk</b>		
Served by the glass	coliforms :<1 c.f.u/ml	25% of samples in Dar met the standard only 8% of the samples in Mwanza met the standard
<b>1254 Total Milk samples</b>	→ Coliforms	655 positive for coliforms ↓
	E. Coli	123 sample positive for E.Coli ↓
	haemorrhagic E-Coli 0157:H7.	Only 3 samples yielded haemorrhagic E-Coli 0157:H7.
386 Milk Samples	Mycobacteria	18 yielded Mycobacterium, none of them was M.Bovis or M. tubercle bacilli
941 milk samples	Brucella spp.	286 (30.3%) positive on Milk Ring test 20.4% positive on the more specific ELISA test, 39% "ready-to-eat" products

Source: Kurwijila et al, 2002a

Given the fact that milk in Tanzania is sold predominantly as raw milk (see previous Table) it can be said that:

- a) Adulteration is a major problem from the "fair business" point of view and carries with it public health risks when judged from the fact that the three haemorrhagic E.coli positive samples were all raw milk samples

- b) Up to 64% of milk boiled and served hot met the TBS standards for pasteurised milk. This re-emphasises the need for sensitizing consumers on the need to heat raw milk before consumption or processing it into such products as fermented milk, cheese etc.
- c) Even though *Mycobacterium bovis* was not detected, the presence of atypical mycobacterium in the milk samples as well as positive reaction to Brucellosis in about a third of the milk samples could pose public health risk, especially among immunocompromised individuals in the case of the MOTTs (Mycobacteria – Other- than - Tuberculosis). Previous studies have indicated the presence of *M. Bovis* among herds of cattle in specific locations in Tanzania ( Markam, 1995; Kazwala, 1996; Darbon *et al*, 1997; Minja *et al*, 1998). The potential risk can not therefore be ignored.

All in all, the above results show that milk marketed in the informal sector in Tanzania poses some public health risks but not to the extent it is usually assumed to be. Existing legislation prohibit the sale of raw milk but this stance has remained unenforceable for the last 30 years. What is required is improvement of hygiene in milk handling and sensitization of consumers to ensure milk is boiled before consumption to minimize those risk. The results show for example that boiled milk drank as hot drink is much safer than when it is taken as chilled drinking milk.

## 11. Importance of dairy information systems

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Information is very important for business decision making. Information on availability and price of various dairy inputs is generally not easily available to farmers, traders and milk processors. Information and data collection, storage and dissemination, is according to the 1997 Agricultural policy a core function of government. The Ministry of Agriculture has a documentation and information unit whose main functions are:

- A) Collect, store and disseminate agricultural and livestock data
- b) Collect, store and make available for public use agricultural and livestock production and marketing information in different forms (electronic databases, printed media etc.)

The Ministry of Water and Livestock Development is currently building its own data base.

According to the draft dairy industry bill one of the main functions of the proposed dairy Board is to:

**“Disseminate the industry information to the interested members of the community”**

In this respect, the interim board, working in collaboration with the Smallholder dairy Support Programme (SDSP), the AustroProject Association and other stakeholders is in the process of launching a website for the Tanzania dairy Industry ([www.dairytanzania.com](http://www.dairytanzania.com)) . A trial version is already running. Other information exchange activities include the biannual dairy development conferences sponsored by various dairy development programmes.

## 12. SWOT analysis of the Tanzania dairy Industry

The dairy industry in Tanzania has a number of strengths, weakness, opportunities and threats which are pro-actively addressed in the summary table below.

Table 7: SWOT ANALYSIS OF THE TANZANIA DAIRY INDUSTRY

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
1. Provides regular income to over 2,000,000 farm families, processors, whole-sales and retail traders. <sup>6</sup>	1.1 The Dairy herd and the traditional livestock have low productivity (in terms of milk produced per hectare/animal unit) due to : low genetic potential of zebu cattle; poor feeding; poor husbandry practices and frequent attacks by animal diseases.	1.2 There is a strong demand for milk and dairy products in areas where people have high purchasing power. The demand is expected to expand in the medium and long term given the expected increase in human population and per capita income. The income elasticity of demand for milk is expected to remain high.	1.3 The liberalization and globalization of trade is a threat to the local dairy industry, especially if imported dairy products are subsidized by exporting countries or import taxes are not paid. These threats can be overcome by improving availability and quality of locally produced dairy products.
2. Milk production has attractive profit margins in most farming areas where appropriate technology is applied.	2.1 Poor monitoring and data collection in the livestock sector. Formation of dairy farmer groups should help form focal points for data and information gathering and dissemination	2.2 Tanzania possesses adequate land resources and climate for supporting different systems of milk production (intensive; and high input high output, exclusive; low input – low output and intermediaries) and for expansion. Policies conducive to private land ownership (affordable land rent, provision of land titles made easy etc)	2. Research in the country is not adequately focused to solving major problems in the sector, for example, there is very little research done on socio-economic issues. There is also a threat to close down a number of research facilities and programs. On farm research in collaboration with farmers should be pursued and supported more vigorously.
3. Dairy farming, particularly on smallholder farms improves the nutrition of the families.	3.1 Dairy products prices to consumers are high (relative to average incomes), despite low production cost, mainly due to high collection and processing costs. This is a reflection of the low milk production density in most milk producing areas, poor road infrastructure and low capacity utilisation in most milk processing plants/units. Moreover, milk production/surplus areas are far from deficit urban centers 3.1.1 Lack of disaggregated information on milk supply and demand. This is a weakness for the future planning of investments in the sub-sector	3.2 There is a good supply of labour that has at least basic primary education and tradition of keeping cattle, sheep and goats. School milk feeding programmes can expand the demand for milk now and in the future. Policies are required to support this more widely in the country.	3.3 The concern over environmental pollution within urban/peri-urban areas may force the government to discourage dairying in and near these centres.

<sup>6</sup> It has been estimated that for every one 4 Livestock Unit (5 animals), one on-farm labour is created and one off-farm employment opportunity in services such cutting grass, transportation and marketing is created for every 50 Livestock unit or 10 farm holdings. With average rural wages of 5,000 –10,000/= per month, contribution to poverty alleviation is extended beyond the farm household (TSDDP, 1996)

<p>4. There is a foundation herd of 450,000 improved dairy cattle and over 15.943 million zebu cattle<sup>7</sup>. Expansion of dairy herd from the available stock is feasible</p>	<p>4. 1 Dairy cattle improvement through breeding and selection is done only on few farms. Given the poor performance of the A.I. services and poor performance of dairy bull's distribution projects will mean a slow expansion of the dairy herd.</p>	<p>4. 2 There is a good supply of trained personnel in different skills and disciplines relevant to dairy production, processing and marketing.</p>	<p>4. 3 Enforcement of regulations on sales of unprocessed milk may depress demand for milk particularly among the poor. This will result in loss of income to producers and traders of unprocessed milk and decreased consumption of milk as processed milk is more expensive and demand for milk is highly price elastic. Encourage improved hygiene</p>
<p>5. During the last two decades considerable experience in the production, collection and processing of milk has been gained, this experience will be a base for an expanded and improved industry.</p>	<p>5. 1 Following reforms in the management and provision of support services that are taking place, the institutional framework for coordinating dairy development is not clear (an industry – wide institutional framework is being worked out.( the National Dairy Board)</p>	<p>5. 2 The crop sub-sector, particularly cereal grain production and agro-processing will provide a considerable amount of by-products suitable for feeding dairy cattle at low cost.</p>	<p>5.3 In some sectors of the dairy industry there is a lack of highly skilled and managerial expertise, especially on large scale dairy farms and in the processing industry</p>
<p>6. Dairy farming offers opportunities for agricultural integration, which will increase farmers benefits, improve environmental protection, and utilise farm resources better</p>	<p>6. 1 Dairy extension is weak in many areas in the country. The biggest constraint is lack of appropriate extension messages to be extended. This in turn is due to poor farmer-extension-research linkage. In addition the services are poorly funded</p>	<p>6. 2 The liberalization of inputs supply and support services offers the private sectors an opportunity for improving the services delivery and profitable investment.</p>	<p>6.2 Increasing land fragmentation with increase in rural area threatens the sustainability of integrated crop-livestock production systems. This threat can be minimized through intensification of production systems and proper land use plans at village and district levels</p>
<p>7. Dairy farming is labour intensive and therefore offers employment opportunities to low skilled people.</p>	<p>7. 1 Research on dairy issues is inadequate to respond to the various needs of stakeholders. Apart from poor linkage indicated above, the services are not adequately funded and they lack a long-term perspective.</p>	<p>7. 2 Many people in the country readily accept goat milk. This offers an opportunity for investing in dairy-goat breeding and production.</p>	<p>7.3 Rural-urban migration reduces productive labour. Also the HIV/AIDS pandemic is a major threat to labour availability and efficiency. Improvement of rural infrastructure including roads, electricity, health services will help mitigate these adverse effects.</p>
<p>8. Dairy industry based on many small holder farmers with potential to develop the industry through co-operation.</p>	<p>8.1 Although farmers organizations have played a very important role in dairy development elsewhere, especially in milk collection and marketing, such institutions are weak in Tanzania.</p>	<p>8.2 Dairy development programmes and the government are putting a lot of emphasis on farmers development through co-operation. Eg creation of Ministry of Co-operatives and marketing in year 2000.</p>	<p>8.3 Poor management and leadership, corruption and government interference in the co-operative movement in the past has scared many farmers from joining co-operatives. Other forms of farmers organizations (association, companies etc) should be explored as alternatives</p>

<sup>7</sup> According to the District Integrated Agricultural survey 1998/99, Tanzania has 451,141 improved dairy cattle and 15,943,827 million zebu cattle (National Bureau of Statistics/Statistics Unit, MoAC, 2001)

## 13. The current progress and future of the dairy Industry in Tanzania

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### 13.1 Potential role of small scale dairy farmers and their organizations

Out of a total of 4.619 million households in Tanzania, 1.605 million of these households (35%) keep cattle at an average of 10.21 head of cattle per household. About 200,000 (12.5%) of cattle keeping households are female headed. These farm families are the basis of the dairy industry in the country. Data on those keeping improved dairy cattle by region or district are scanty. This type of data is only available in regions with dairy development programmes. For example, In Tanga region it is reported that about 4000 households keep 10,000 head of dairy cattle while in Kagera, 7000 households keep about 16,000 head of improved dairy cattle (SDSP, 2002). The average is 2 – 3 head of cattle per household. Therefore the average dairy farmer in Tanzania is typically small scale owning 1-2 acres of land on which mixed farming is practiced. Market orientation of this type of farming requires organized input supplies and marketing of milk. This can best be achieved through farmers organizations. This strategy is the cornerstone of the policies being pursued by the government, development programmes and NGOs active in the dairy industry. The functioning of the proposed Tanzania dairy development Board pre-supposes the existence in future of strong stakeholder organization at District level in all areas where dairying is an important activity. There is expected to be strong Milk producer organizations linked at the national level by the Tanzania Milk producers Association (TAMPRODA) now in formative stages. Among milk producer and marketing groups, women are playing a very significant role because they are actively involved in cattle rearing as well as milk marketing. Among the Maasai for example milking and household level management of milk for domestic consumption and sales is a traditional role of women. Among small holders, women do most of the on-farm work. (SDSP, 2002)

Currently Milk processors have their own association, the Tanzania milk processors Association (TAMPA) which represents the interests of milk processor in the Dairy Board. These and other organisations yet to come (Input suppliers organization, Consumer organization) will be important in steering the sustainable development of a vibrant dairy industry in Tanzania.

### 13.2 Role of other regulatory bodies and institutions

The safety aspect of all foods in Tanzania, including milk and milk products are currently vested in the National Food and Control commission (NFCC) of the Ministry of Health under the Food (Control of Quality) Act , 1978. District health officers embedded in the Local Government authorities act as Food inspectors on the behalf of the Commission and are empowered to inspect and license food handling and processing premises including dairies. This legislation is to be replaced by the recently enacted Food, Drugs and cosmetics Act , 2002 under which the Tanzania Food and Drug Authority (TFDA) will replace the NFCC. Under this new Act, the dairy industry is addressed directly in articles 38(1) and 39 ( 1 – 3) only<sup>8</sup>.

The setting of Food Standards including milk and dairy products standards will remain the domain of the Tanzania Bureau of Standards (TBS). The proposed Dairy Board will be an agent for the development of the dairy industry and will contribute to the formulation of standards for the industry through representations in TBS and possibly the FDA. The health officers will remain the enforcers of standards and regulation regarding food hygiene and safety as it pertains to the dairy industry. In

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<sup>8</sup> Section 38(1) empowers the Minister of Health to make rules regulating the composition of milk and addition to milk of any additives/preservatives while section 39 (1-3) prohibits the sale for human consumption of tuberculous milk or milk from a cow affected by any zoonoses.

the absence of proper diagnostic and proper laboratory facilities in the regions or zones, the role of health inspectors to control the quality of marketed milk has been limited to licensing and inspection of premises rather than quality control of food and dairy products per se. Hence enforcement of the relevant regulations and standards remain low or absent altogether in most local authorities.

### 13.3 Strategy for inclusion of informal sector

In recognition of the important role played by the informal milk marketing agents in linking rural milk producers in inaccessible areas to consumers directly or via milk collection agents and/or processors, there is need to devise means and ways of involving them proactively in fostering the development of dairy industry that is responsive to market demand and public health concerns.

The following could be considered:

- a) Lay down minimum conditions for registration and licensing delivery of safe and hygienic milk. These could be : prescribing the need to use milk vessels that are easy to clean and suitable for carrying on bicycles
- b) Providing for specified outlets in neighbourhood that may be more easily inspected (in Mwanza for example certain routes end at a specific locations e.g. at the Ferryboat terminal but there are no hygienic facilities provided by the Municipal authorities for milk sales/inspection)
- c) Encouraging formation of Milk Hawkers/vendors associations that could be assisted in setting of their own "code of conduct" which meet minimum hygienic and safety standards including member imposed penalties for adulterating milk.
- d) Encourage local authorities to set up milk marketing orders/arrangements/or agreements in collaboration with various stakeholders (vendors, processors etc)

### 13.4 Critical control points for the improvement of food safety in the dairy producer to consumer chain.

The Hazard analysis critical control points (HACCP) procedure is a useful preventive tool that helps the detection of critical points for controlling and minimizing food contamination enabling the timely institution of corrective measures before the potential contaminations actually occur. While this requires well defined protocols in a uniform environment, its general understanding and application in a wide setting such as when looking at an entire production system involving many players, serves a useful purpose in providing guidelines that will help minimize potential risks in general. Below is a summary of a HACCP approach that can be applied in a dairy systems involving many farmers, processors and retailers. It involves basic Good Hygiene Practices (GHPs) at the farm level as well as Good Manufacturing Practices (GMPs) at factory level to eliminate potential hazards

**Table 9 : HACCP quality control system for minimizing risks and improving quality and safety of milk and milk products.**

Step in the chain	Risks/hazard	Preventive measures	Critical Control points	Critical limits	Monitoring procedure
<b>At the farm level</b>					
Milking	➤ Physical dirt	➤ Clean and sanitise cow + milking equipment and milk storage vessels	➤ Detergent concentration ➤ Temperature of cleaning solutions	➤ As specified by manufacturer ➤ 75 –79 °C for circulation cleaning	➤ Visual inspection
	➤ Extraneous water	➤ Clean and dry equipment before milking	➤ Milking parlour ➤ Milking vessels, cans	➤ Absence of visible water	➤ Visual inspection
	➤ Spoilage micro-organisms	➤ Clean and sanitise cows udder, milking equipment ➤ Cool milk promptly	➤ Cows udder ➤ Milking parlour and equipment ➤ Milking cooling tank	➤ Absence of visible dirt	➤ Visual inspection
	➤ Drug residues	➤ Observe withdrawal periods	➤ At least 72 hours for most drugs	➤ 3-4 hours for yoghurt incubation	➤ Fermentation test
	➤ Pathogenic bacteria	➤ Screen cows for mastitis regularly ➤ Screen cows for TB, Brucellosis	➤ Cows udder		➤ Regular California Mastitis test
	➤ Feed Off-flavours	➤ Do not feed silage 2 hours to milking		➤ Organoleptically detectable smell	➤ Inspect feed rations regularly ➤ Carry out organoleptic tests on suspect samples
<b>Milk processing</b>					
Cleaning and sterilization of process lines	➤ Pre-and post process contamination by harmful micro-organisms which affect product shelf life and/or cause flavour defects	➤ Efficient cleaning of all lines and tanks	➤ Detergent concentration ➤ CIP circulation time ➤ Sterilization temperature and time	➤ As specified by manufacturer ➤ 75 –79 °C for circulation	➤ Swabs to check cleaning efficiency ➤ Visual inspection by Quality controller
Milk Intake	➤ Accepting poor quality milk (high TPC, souring ➤ Presence of drug residues ➤ Adulterated milk	➤ Plat form quality testing (Alcohol, Acidity, organoleptic tests)	➤ Milk reception	➤ Absence of clot on 68% alcohol test	➤ 10 min. Rez. Reading of not less than 31/2 % ➤ LA not more than 0.19% ➤ SNF not less than 8.5%
Pasteurisation	➤ Food poisoning caused by under-pasteurisation.	➤ Check reading of pasteuriser; flow diversion valve in PHE	➤ Pasteuriser ➤ Product tank for pasteurised milk	➤ Pasteurising temp. 72 oC; 15 s; 63 oC, 30 min.	➤ Thermographs ➤ Phosphatase test ➤ Coliform test after packing



				➤ Phosphatase disk reading 0 not less than 3.1%	➤ QC on sachet fill and seal; weights and lengths
Standardisation	<ul style="list-style-type: none"> <li>➤ Substandard B/F &amp; SNF</li> <li>➤ Overfill/underfills</li> <li>➤ Leakers</li> </ul>	<ul style="list-style-type: none"> <li>➤ B/F test</li> </ul>	<ul style="list-style-type: none"> <li>➤ Machine adjustments before packing and after few units run through</li> </ul>		<ul style="list-style-type: none"> <li>➤ Use only good quality packing film</li> <li>➤ Check leakers list every day</li> </ul>
<b>Storage and distribution</b>	<ul style="list-style-type: none"> <li>➤ Quality deterioration due to poor transport and storage conditions</li> </ul>	<ul style="list-style-type: none"> <li>➤ Maintain cold chain 1 – 5 °C.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Insulated distribution trucks</li> <li>➤ Cold storage rooms in retailing circuit</li> </ul>		<ul style="list-style-type: none"> <li>➤ Cold room temperature checks</li> <li>➤ Ex-truck delivery temperature checks</li> </ul>
<b>Product handling at Retails outlets</b>	<ul style="list-style-type: none"> <li>➤ Quality deterioration due to poor transport and storage conditions</li> <li>➤ Overstocking, non observance of stock rotation (FIFO)</li> </ul>	<ul style="list-style-type: none"> <li>➤ Marketing visits and education leaflets</li> <li>➤ Packaging instructions on storage conditions</li> </ul>	<ul style="list-style-type: none"> <li>➤ Refrigerated retailing storage vessels temperature</li> </ul>	<ul style="list-style-type: none"> <li>➤ Shelf life min 5-7 days for Pasteurised milk</li> <li>➤ Not more than 10 °C in storage vessels</li> </ul>	<ul style="list-style-type: none"> <li>➤ Quality audits in retail outlets</li> <li>➤ Sampling products on shelf for lab analysis</li> <li>➤ Consumer surveys and feed back</li> </ul>

## 14. Recommendations

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### 14.1 Recommendations for reducing post-harvest losses

While it is believed the dairy industry suffers considerable post harvest losses, there is inadequate data and hence the problem is not easily quantified. There is need to carry out a comprehensive survey to quantify post harvest losses in the Tanzania Dairy Industry.

**Recommendation:** Develop a methodology for rapid assessment of post harvest losses in the dairy Industry and carry out such a study.

**Follow-up action:** FAO PFL Project coordinator

### 14.2 Technology Transfer

Transfer of improved technologies will be required to address:

#### a) Improvement of farm level hygiene, handling and transportation.

Technologies to achieve this are available and include the regular use of dairy sanitizers, mastitis test kits and better milk handling vessels such as availability of suitable metal cans. The lack or non use of these technologies is essentially a supply and access problem including affordability.

**Recommendation:** It is recommended that dairy stakeholder organizations such as dairy Boards should embrace input suppliers as one of the key players in the dairy industry and make known to them (through information exchange and sharing) what the needs of the dairy industry are with regard to dairy hygiene inputs.

**Follow-up action:** Interim Tanzania Dairy Development Board and Ministry of Water and Livestock Development

#### b) Improving quality and safety of locally processed products

*The existing gap between the desirable quality of dairy products and what is produced in Tanzania by small-scale processors is largely a problem of awareness, lack of appropriate and affordable processing and packaging equipment and materials. PLS CLARIFY* Although such equipment and materials are available in different countries of the world, the small size of the in-country markets, makes it unattractive for private input suppliers to stock such equipment. A regional approach might be more attractive to entrepreneurs who may wish to supply such equipment.

**Recommendation:** The Project should identify and make known potential regional suppliers of appropriate dairy equipment for the E.African Region and provide them with information on the pieces of technologies and/or equipment that are likely to most demanded in the region.

**Follow-up action:** PFL Project coordinator

### 14.3 Training

Most informal market milk handlers and small scale processors lack adequate training in dairy hygiene and in processing skills which are essential to addressing issues of product quality and safety.

**Recommendation:** The Project should facilitate an in-country training needs assessment as well as assessing the national capacity to offer such needed training with a view to facilitating development of at least one center of excellence in this level of training especially with regard to short and outreach courses.

**Follow-up action:** PFL Project coordinator and National Focal Point

### 14.4 Information Platform

While the interim Tanzania Dairy Development Board has as one of its key mandate the Dissemination of the industry information to the interested members of the community a Data collection, analysis, storage and monitoring system that is managed by TDDB will have to be put in place first.

Dairy industry and Market information will have to be one of the key components of the national information systems. The launching of the Dairy Tanzania website is a move in the right direction. The website will have to be linked to a regional as well as FAO dairy outlook platform. Dairy Tanzania will then become a gateway for dairy industry information for any interested party in Tanzania.

**Recommendation:** The Project should facilitate the establishment of a regional dairy industry network that will link together the National Websites managed by the national dairy Boards.

**Follow-up-Action:** PFL coordinator, Interim TDDB secretariat and the Ministry of water and Livestock Development

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