ECONOMIC AND SOCIAL RESEARCH FOUNDATION

(ESRF)


# MKUKUTA BASED MDGs COSTING FOR THE AGRICULTURE SECTOR

FINAL REPORT

June 2006

# Table of Contents

# LIST OF TABLES

# LIST OF FIGURES

# ABBREVIATIONS

| | |
|---|---|
| ASLM | Agricultural Sector Lead Ministries |
| ASDP | Agricultural Sector Development Programme |
| ASDS | Agricultural Sector Development Strategy |
| BOT | Bank of Tanzania |
| FAO | Food and Agriculture Organisation |
| FDI | Foreign Direct Investment |
| GOT | Government of Tanzania |
| IPM | Integrated Pest Management |
| JAS | Joint Assistance Strategy |
| LGA | Local Government Authorities |
| MAFC | Ministry of Agriculture, Food Security and Cooperatives |
| MDGs | Millennium Development Goals |
| MFI | Micro Finance Institutions |
| MITM | Ministry of Industries, Trade and Marketing |
| MKUKUTA | National Strategy for Growth and Reduction of Poverty |
| MLD | Ministry of Livestock Development |
| MTEF | Medium Term Expenditure Framework |
| NARS | National Agricultural Research Systems |
| ODA | Official Development Assistance |
| PER | Public Expenditure Review |
| PO-RALG | President's Office-Regional Administration and Local Government |
| PPPs | Public-Private Partnerships |
| RDS | Rural Development Strategy |
| TDV | Tanzania Development Vision 2025 |

# EXECUTIVE SUMMARY

## Purpose and Rationale

Agriculture is the back-borne of the Tanzanian economy. It contributes over 47% of the country's national output (GDP), employs over 75% of its people, and accounts for over 41% of its foreign exchange. Thus, the transformation of agriculture is essential for accelerating Tanzania's socio-economic development, including poverty reduction.

In the pursuit of the National Strategy for Growth and Reduction of Poverty (MKUKUTA) and Millennium Development Goals (MDGs), specific cluster strategies and intervention packages have been identified to achieve set targets. The MKUKUTA based MDG costing for agriculture aims at answering the question about what it takes in terms of resources to meet the targets set under this sector.

## MKUKUTA Targets

The MKUKUTA based MDG costing for agriculture took into consideration what it takes in terms of resources to achieve the following targets:

- Increased agricultural growth from 5% in 2002/03 to 10% by 2010;
- Increased growth rate for livestock sub sector from 2.7% in 2000/01 to 9% by 2010;
- Increased food crops production from 9 Millions tons in 2003/04 to 12 Millions tons in 2010;
- Maintained Strategic Grain Reserve of at least 4 month of national food requirement;
- Reduced proportion of rural population (men and women) below the basic needs poverty line from 38.6 percent in 2000/01 to 24 percent in 2010;
- Reduced proportion of rural food poor (men and women) from 27% in 2000/01 to 14% by 2010;
- Increased productivity and profitability both within agriculture and outside agriculture sector;
- Increased off farm income generating activities; and
- Secured and facilitated marketing of agricultural products.

## Review of Existing Costing in Agriculture

In recent years, several costing efforts have been undertaken that estimate the resource needs of various sets of interventions in agriculture. These include:

- Indicative costs for implementing the Agriculture Sector Development Strategy (ASDS): Yearly costing: US$ 255.3 million.

- Costing under the Public Expenditure Review (PER) and Medium Term Expenditure Framework (MTEF). Yearly costing: US$ 245.5 million.

- Costing under World Bank Millennium Development Goals (MDGs): Yearly costing: US$ 127.3 million.

The MKUKUTA based MDG costing undertaken for agriculture learned from these previous costing and provide a reference for comparison. However direct comparison should be avoided because each costing had different assumptions, identified different areas of interventions or placed priority on certain interventions in relation to others and had different assumptions on how to transform agriculture into a more vibrant, modern sector.

## Costing Methodology

The methodology for the MKUKUTA based MDG costing for agriculture is as follows:

- Cost estimates were made within the MKUKUTA context – based on strategic policy options and choices for prioritising the ways and means of realising the MKUKUTA (MDG) goals and objectives related to agriculture.

- Costing work followed a participatory process that was driven by the sectors and key stakeholders, supported by experts.

- Costing was assumed financially unconstrained. In other words costs were not based on current or past resource allocations to the agriculture sector. Rather, the costs reflect resources required to achieve MKUKUTA and MDGs targets.

- All costs are in USD equivalent exchange rate for year 2005. The exchange rate used: 1100 Tshs/USD.

- Costing work used component analysis. This methodology had seven main steps, namely:

    - Reviewing and analysing each main crop and livestock and support activities (such as research and extension) to determine performance (in the past 5-10 years) – Example: location, area cultivated, average yield, returns (revenue from sales), etc.;

    - Identifying main constraints/problems for each main crop and livestock and other agriculture support activities;

    - Identifying main interventions that if implemented under MKUKUTA/MDGs would reduce or eliminate the constraints/problems. This also entailed estimating the impact of each intervention, where necessary;

    - Projecting growth/production of each of the main crop and livestock – by using historical yield/production behaviour and known yield potential for each main crop and livestock, suitably adjusted to ensure MKUKUTA/MDGs targets would be met.

    - Identifying cross-sectoral and cross-cutting interventions that are essential for achieving MKUKUTA/MDGs targets in agriculture.

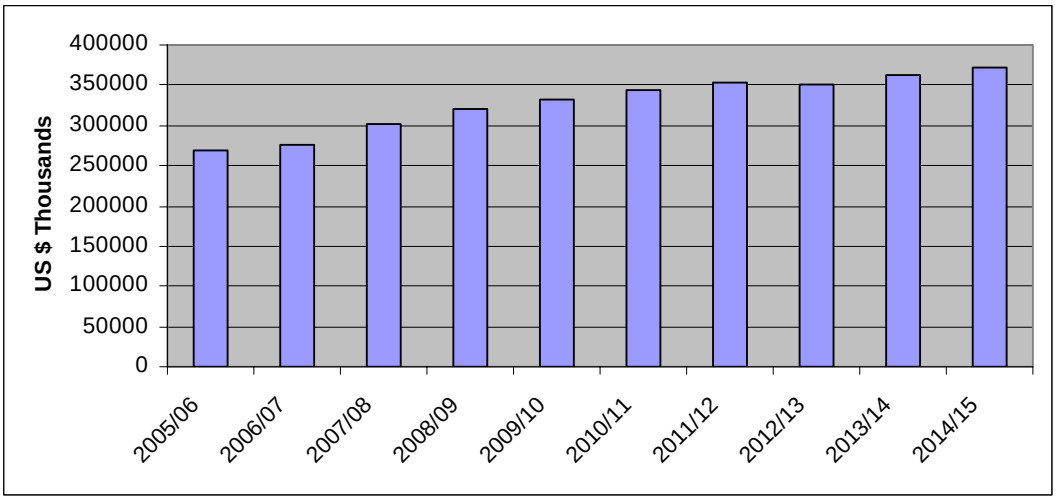
    - Determining the unit cost of each intervention using average market rates/prices.

    - Projecting resource requirements by multiplying unit costs with each of the respective intervention over the period up to 2015.

Summary of Findings

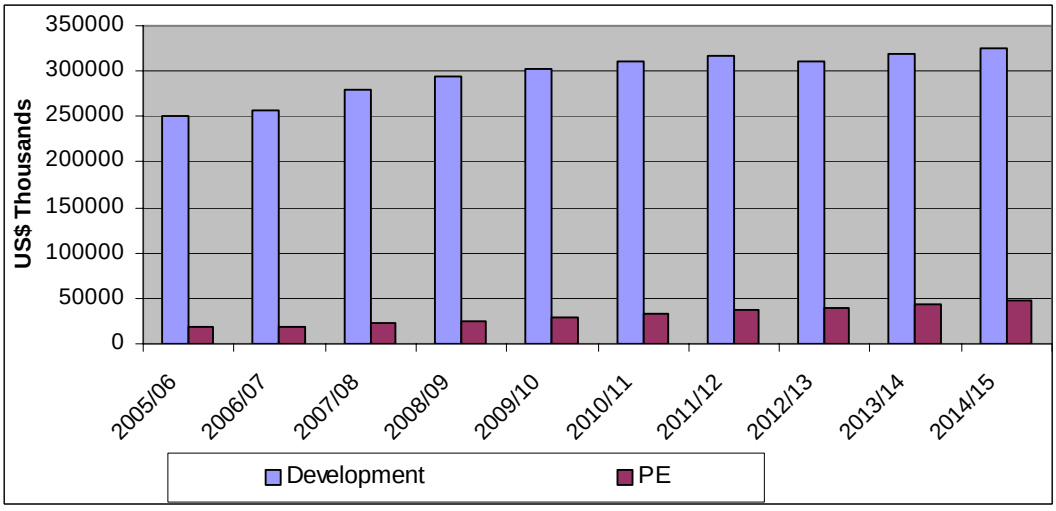
Overall, as Figure E.1 shows, total resource requirements for the agriculture sector is expected to increase by 23.1 percent from US$ 269.3 million in 2005/06 to US$ 331.4 million by 2010 (end of Phase 1 of MKUKUTA). By 2015 (end of MDGs), resource requirements are expected to have risen by 38.4 percent to US$ 372.6 million. The average projected yearly resource requirement is US$ 300 million during the MKUKUTA period up to 2010. Thereafter, yearly requirements average US$ 356 million up to the end of MDGs in 2015.

Figure E.1: Total Projected Resource Requirements




*Total Development Resources*. The interventions envisaged to meet MKUKUTA/MDGs targets will require an average of US$ 275 million per year for development resources during the MKUKUTA period. During Phase 1 of MKUKUTA resource requirements will increase by 20.1 percent from US$ 251.5 million in 2005/06 to US$ 302 million by 2010. Thereafter, it is expected that an increase of about 29.4 percent (US$ 347 million) will be required by 2015.

Figure E.2: Development and PE Resource Requirements

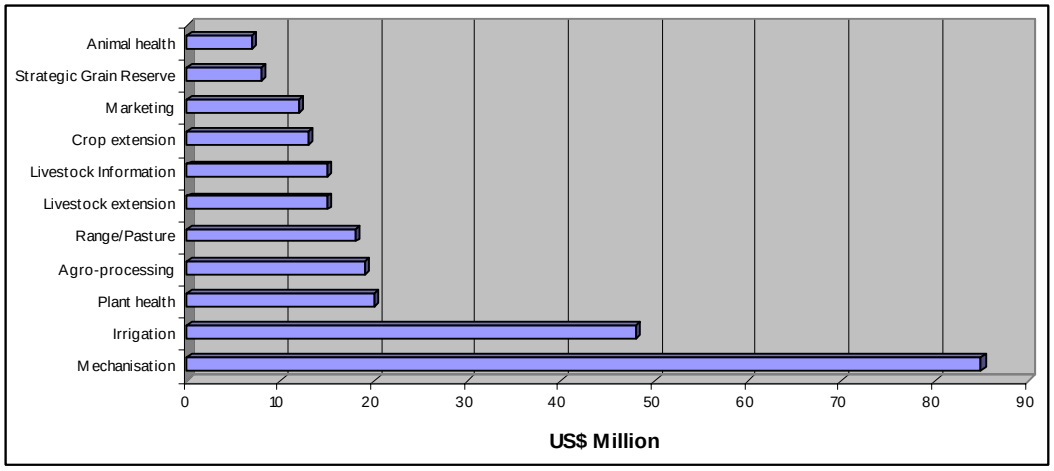


*Personal emoluments (PE).* PE for the agriculture sector is expected to increase by 64 percent, from US$ 17.8 million in 2005/06 to US$ 29.3 million by 2010. By 2015 projections show that PE requirements will have tripled (Figure E.2).

## Main Agriculture Interventions

Key interventions and their annual resource requirements are depicted in Figure E.3 below. These interventions are: (i) Mechanisation of agriculture by progressively moving away from the hand hoe to animal traction and other fuel-powered farm machinery and implements. (ii) Irrigation to move away from excessive reliance on rainfall and improve yields. (iii) Improvement of crop and livestock extension services to transform agriculture through improved extension-research-farmer and other stakeholder linkages in the sharing and adoption of new farming techniques using participatory approaches. (iv) Animal and plant health to improve yield. (v) Range and pasture improvement and management. (vi) Agro-processing to add value to all agricultural output. (vii) Improvement in information and marketing of crop and livestock products, both domestically and in the international market. (viii) Grain reserve, including on-farm storage improvement to foster food security, reduces post-harvest loss and improves quality of farm produce.

Figure E.3: Key Interventions and Annual Resource Requirements




## "Quick Wins"

Agricultural transformation does not lend itself easily to "quick wins". Changing the mind-set of peasant farmers to adopt and implement new productivity-enhancing technologies takes time. The problem is monumental because most farmers have inadequate formal education and lack financial strength to translate intentions into action. This is exacerbated by lack of development finance mechanisms. Despite the problems identified above, the following areas should receive priority as possible "quick wins":

Foremost priority should be revamping the extension services for both crop and livestock and developing rural development finance mechanisms for supporting agricultural growth and overall development of the country. Equally important should be to develop a comprehensive network of infrastructure support, including irrigation systems, rural roads, power and telecommunication systems and marketing and

information systems. Further, the "Quick wins" identified under the ASDP such as rationalizing local tax levels and procedures, simplifying trade and processing regulations, strengthening local trade and market information systems, and undertaking business training and support services for small and medium enterprise development should be accorded priority during implementation.

## Financing Strategy

Table E.1 below shows the resource gap between the MKUKUTA based MDG costing and Government current budget trends. Overall, the gap is higher during the MKUKUTA period (2005-2010), declining progressively up to the end of MDG period in 2015.

Table E.1: MKUKUTA/MDGs Resource Requirements Compared with Budgetary Trends

| | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total MKUKUTA/ MDGs Costing | 269292 | 275446 | 302261 | 319782 | 331437 | 343659 | 353064 | 350185 | 362969 | 372611 |
| Estimated Current Budget Trends | 145724 | 156066 | 169249 | 182432 | 195614 | 208797 | 221980 | 235163 | 248345 | 261528 |
| Resource gap | 123568 | 119380 | 133012 | 137350 | 135823 | 134862 | 131084 | 115022 | 114624 | 111083 |
| Gap % of Requirements | 45.9 | 43.3 | 44.0 | 42.9 | 40.0 | 39.2 | 37.1 | 32.8 | 31.5 | 29.8 |

It is envisaged that the financing gap will be filled through the following mechanisms:

- Increased Government own funding to the agriculture sector;
- Greater solicitation of donor funding for the agriculture sector;
- Greater share of debt relief funds allocated to agriculture sector;
- Greater efforts made at soliciting and encouraging private local and foreign direct investment in agriculture; and
- More active community participation in transforming agriculture using own labour and financial resources.

# 1.0 BACKGROUND AND STRATEGY FOR AGRICULTURAL SECTOR DEVELOPMENT UNDER MKUKUTA/MDGS[1]

## 1.1 Introduction

The importance of agriculture in achieving the National Strategy for Growth and Reduction of Poverty (NSGRP) or MKUKUTA targets cannot be over emphasized. In the short to medium term, the sector remains to be the main stay of the economy. The Agriculture sector comprises of crops, livestock, fisheries and forestry sub sectors[2]. It contributes significantly in terms of aggregate growth, exports, employment and linkages with other sectors. Agriculture in Tanzania employs the majority of the poor, and has strong consumption linkages with other sectors. In 2004, the sector contributed approximately 51 percent of foreign exchange, 75 percent of total employment and 47 percent of the Gross Domestic Product (GDP). Smallholder farming dominates agricultural production, and a large proportion is for subsistence.

Constraints to rural growth are largely related to those in the agricultural sector, and these include low productivity of land, labour and production inputs; underdeveloped irrigation potential; limited capital and access to financial services; inadequate agricultural technical support services; poor rural infrastructure hindering effective rural-urban linkages; infestations and outbreaks of crop and animal pests and diseases; erosion of natural resource base and environmental degradation. Others include gender relations, weak producers' organizations, poor coordination and limited technological capacity, depressed prices for primary commodities in global markets and insecurity with respect to property rights to land and its use as collateral for credit.

## 1.2 MKUKUTA and Agricultural Related Actions

MKUKUTA provides an all-important countrywide strategic framework of reference in all poverty reduction initiatives and processes. Agricultural related interventions fall under cluster 1 of "*Growth and Reduction of Income Poverty*". Table 1.1 provides operational targets, cluster strategies, and intervention packages for the agricultural related interventions as derived from the MKUKUTA Matrix.

[1] This section is based on analysis done by the World Bank (2004), Tanzania Agricultural Sector Development Strategy (ASDS) and National Vision 2025.

[2] Note however that in the context of this costing exercise, the Agricultural sector takes on board the crop and livestock sub-sectors only.

## Table 1.1: Agricultural Related Interventions for MKUKUTA

| Goal 2: Promoting Sustainable and Broad Based Growth | | |
|---|---|---|
| **Operational Targets** | **Cluster Strategies** | **Intervention package** |
| *1.* Increased agricultural growth from 5% in 2002/03 to 10% by 2010. | Increase number of irrigation schemes and development of more efficient use of water schemes. | Infrastructure development |
| | | Natural resources management |
| | Increase area under irrigation and promote water use efficiency in irrigation schemes and encourage utilization of low cost technologies | Agriculture sector development |
| | | Policy review |
| | | Technology |
| | Promote rainwater harvesting incorporating small, medium and strategic large-scale dams and reservoirs. | Rainwater harvesting |
| | | Infrastructure development |
| | Increase productivity in existing agricultural activities through adoption of and investment in more productive technological packages in agriculture (farming and husbandry) | Agricultural productivity |
| | | Agricultural farm technology |
| | Increase training and awareness creation on safe utilization and storage of agro-chemicals (including agriculture and livestock inputs, e.g. cattle dips), and the use of integrated pest control, eco-agricultural techniques, and use of traditional knowledge. | Training and awareness raising in environmental management |
| | Improve human resources capacity and efficiency in agricultural services delivery | Capacity development |
| | Strengthen capacity for timely control of crop pests and disease outbreaks in particular *Quelea quelea*, armyworms, locusts, rodents and trans-boundary crop and animal disease, promote Integrated Pest Management (IPM). | Capacity development |
| | | Integrated Pest management |
| | Improve and increase access to support services with particular focus on research and extension meeting the needs of farmers, fishermen, foresters and livestock keepers; and increase communication and collaboration in delivery of extension services. | Access to support services |
| | | Communication and collaboration |
| 2. Increased growth rate for livestock sub sector from 2.7% in 2000/01 to 9% by 2010 | Promote efficient utilization of rangelands and empowerment of pastoral institutions, for improved livestock productivity | Utilization of range land |
| | | Sensitisation of pastoralists |
| | Promote programmes that increase income-generating opportunities for women and men in the rural areas through promoting local small-scale industries, non-traditional products and traditional crafts. | Income generation programmes |
| | | Promotion of local small scale industries for diary products |
| | | Market development |
| | Promote pastoralism as a sustainable livelihood system. | Pastoralism |
| | | Sensitisation of pastoralists |
| | Construct more water charcos; improve access and quality of veterinary services; and promote dairy and leather industries (SMEs). | Infrastructure development<br>Promotion of dairy products- related SMEs |
| | Ensure improved access to reliable water supplies for livestock development through promotion of small-scale rainwater harvesting. | Technology |

| Goal 3: Improved Food Availability and Accessibility at Household Level | | |
|---|---|---|
| **Operational Targets** | **Cluster Strategies** | **Intervention package** |
| 1. Increased food crops production from 9 Millions tons in 2003/04 to 12 Millions tons in 2010. | Improve access to inputs by subsistence farmers through targeted inputs-subsidy to selected food crops and increasing accessibility to micro finance credit | Agriculture productivity related to food production; energy |
| | Research, identify and promote food storage technologies/ facilities and enhance agro-processing as well as environmentally friendly farming technologies and practices especially for rural areas. | Technology/Environment |
| 2. Maintained Strategic Grain Reserve of at least 4 month of national food requirement | Improve stock management and monitoring of food situation | Storage facilities and technology |
| | Undertake a review of the maize supply chain, management and monitoring of emergency food supplies, including further clarification of regulation and means of enhancing trade. | |
| **Operational Targets** | **Cluster Strategies** | **Intervention package** |
| 1. Reduced proportion of rural population (men and women) below the basic needs poverty line from 38.6 percent in 2000/01 to 24 percent in 2010 | Encourage production of crops with high returns; Increase access to mechanization and use of appropriate technologies, including rural energy services, that reduces drudge8ry. | Agriculture, technology, energy |
| 2. Reduced proportion of rural food poor (men and women) from 27% in 2000/01 to 14% by 2010. | Promote post harvest management techniques in the rural households Promote schemes that add value to primary agricultural, fishing, forest products, wildlife, and livestock products. | Agriculture, business, Human Development, Gender and Youth |
| 3. Increased productivity and profitability both within agriculture and outside agriculture sector. | Pursue policies that attract public and private investments in agriculture (including livestock) and natural resources, promote diversification to non-farm activities. | Investment promotion |
| | | Private sector development |
| 4. Increased off farm income generating activities | Increase access to rural micro financial services for subsistence farmers, particularly targeting youth and women; and promote off farm activities with particular focus to supporting establishment of agro processing SMEs; Promote and sustain community based savings and credit schemes such as SACCOS and revolving funds. | Rural micro finance |
| | | Promotion of off farm activities |
| | | Promotion of Agro processing industries |
| | Enhance life skills and entrepreneurship training for rural population particularly women and youths. | Skills development, technology |
| 5. Secured and facilitated marketing of agricultural products. | Identify new markets, promote products that maximize value addition and tap new opportunities for supply chains in the country. | Research on markets |
| | | Product market |
| | Improve transport systems, thus, lowering transport costs, and improve marketing to ensure higher profit margins for producers. | Transport cost |
| | | Market access |
| | Invest in infrastructure and widen access to markets within the country, region and internationally to increase productivity and incomes in agriculture. | Investment in Agriculture |
| | | Market access |
| | | Productivity increase |

| Goal 3: Improved Food Availability and Accessibility at Household Level | | |
|---|---|---|
| Operational Targets | Cluster Strategies | Intervention package |
| | Provide reliable and affordable energy for economic development, Provide alternative rural energy, and energy efficiency schemes, which reduce energy consumption and women's workload. | Development of rural energy |
| | Create enabling environment for Rural Energy Agency (REA) and Rural Energy Fund (REF) so as to promote accessible and affordable rural electrification for productive uses. | Rural technology development |
| | | Research on alternative rural energy |
| | Increase access to reliable water as a resource for economic production with the aim of increasing the contribution of water in GDP. And ensure sustainable management of water catchments areas and maintenance of forest cover in critical highland catchments areas. | Water resources management and development |
| | | Provision of economic services |
| | | Natural resource management |
| | Scale up community development initiatives e.g. community-based rural road construction and enhancement of programmes such as SIDO, TASAF and SELF that focus at micro level. | Community development |
| | | Micro credit scheme development |
| | | Awareness raising |
| | Identify and review laws, and advocate against cultural practices, which deny women and youth access to productive and financial assets – including inheritance law and personal property rights. | Revision of laws and regulations |
| | | Sensitisation programmes |

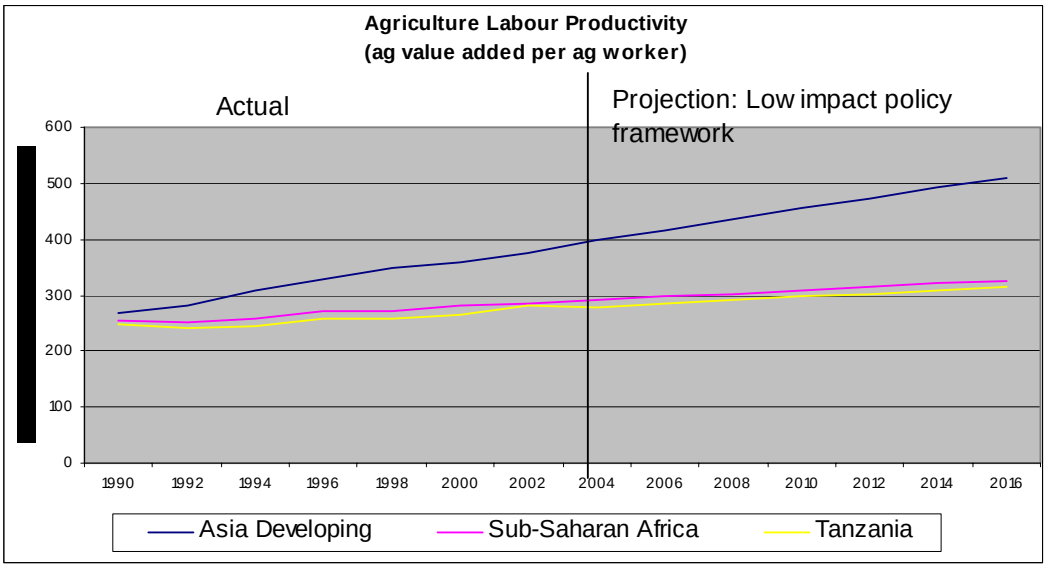
## 1.3 Strategies for Agricultural Growth

First and foremost, agriculture needs to be accorded priority in the country's development process – by action not words. Often much rhetoric about agriculture being the backbone of the economy is not matched with political will backed by adequate resources. There is need to "walk the talk". Second, agricultural taxation is too high. This discourages investment, particularly of entrepreneurs who would like to invest in agriculture – condemning the sector to small scale, largely subsistence producers. It also provides the wrong signals for small scale produces, acting as a disincentive to adopt more productivity-increasing technologies and unintentionally reduces farm incomes. Third, there is an urgent need to change the "mind-set" of farmers to appreciate and adopt new farming technologies. Slash-and-burn farming, overgrazing due to keeping large stocks of livestock (compared with the land carrying capacity), deforestation – to mention, but a few, requires concerted efforts at changing behaviour and long-cherished traditions that are largely detrimental to the environment. Fourth, there is also a need to reduce the high transaction costs in the agricultural sector because these tend to make the sector unprofitable and hinder private investments. These interventions require little money and greater strategic approach in the transformation of agriculture.

Next, efforts are required at raising labour productivity in agriculture. Tanzania's past agricultural growth has depended on the expansion of area cultivated, and, as is the case in much of Africa, has been accompanied by only modest increases in labour productivity. As shown in Figure 1, labour productivity in Africa has increased only since 1994. Figure 1 also shows that Tanzania's 1.1% per year increase is below the norm for other Sub-Saharan countries. The data also highlights the emerging disparity in labour productivity between Tanzania and Asian countries. The gap in labour productivity levels increased from less than 10 percent in 1990 to more than 40 percent in 2002. This entails significant catch up efforts that needs to begin with earnest implementation of MKUKUTA.

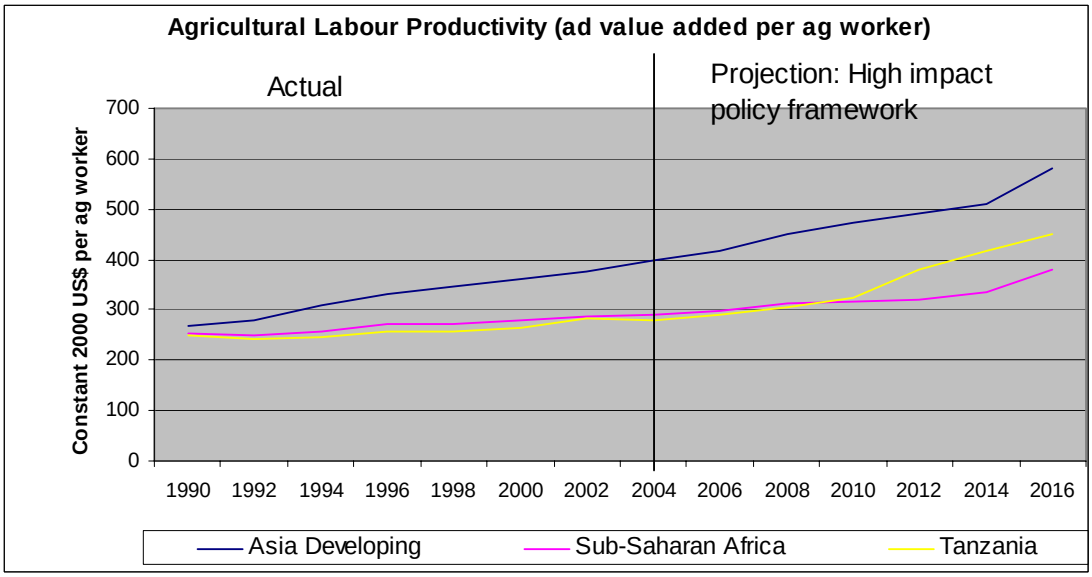
Tanzania's experience shows that with very modest increases in labour productivity and yields almost stagnant, agriculture growth was derived largely from land expansion by smallholder farms. The land expansion was accomplished using traditional technology, with little evidence of improved technical inputs and management practices. However, in Tanzania there are examples of land expansion through labour saving innovation, particularly expansion using animal traction in Rukwa and Mwanza regions. But for the sector as a whole, the growth pattern of the past replicates poverty, rather than reducing it, since households do not experience income growth. Moreover, land expansion using existing techniques carries environmental costs, as forests are encroached upon and increasingly marginal land comes into cultivation. As Figure 1 shows, projecting this scenario into the future yields only modest increases in productivity.

Figure 1: Labour productivity levels in Tanzania and comparators: Low impact scenario[3]




Source: World Bank (2004), "Development Data Platform", Washington D.C.

Figure 2: Labour productivity levels in Tanzania and comparators: High impact scenario




Source: World Bank (2004), "Development Data Platform", Washington D.C

The proposed interventions under MKUKUTA and MDGs are to step up productivity increases through support of environmentally friendly cultivation technologies and methods – the high impact scenario shown on Figure 2. This optimistic policy framework leads to levels of productivity that are higher than the average for other Sub-Saharan countries by 2010.

[3] Asia Developing includes India and China. Sub-Saharan Africa excludes South Africa. Projections made by the authors.

Several features support the high impact policy framework. First, Tanzania still has significant potential to expand agricultural production through land expansion (Table 1.1). In this regard, a component of agricultural mechanisation will be included under MKUKUTA/MDGs. However, in order to improve agricultural incomes, MKUKUTA envisages land expansion that goes hand in hand with improvements in *agricultural productivity* through greater investment in land improvements, both on existing and newly cultivated areas, by adoption of yield increasing technologies, and by making strategic shifts in the composition of output toward products with higher value added – both for the domestic and export market.

Table 1.2: Land use and potential for land expansion (mid 1990s)

| Land use | '000 ha | % total land area |
|---|---|---|
| • Urban | 65 | 0.1% |
| Rural protected land | | |
| • protected forest/woodland | 13,838 | 15% |
| • other protected (wildlife, nat. park) | 13,291 | 14% |
| Agricultural land currently used (10.8 million ha total) | | |
| • temporary crops | 3,700 | 4% |
| • pasture | 6,150 | 6.5% |
| • permanent crops | 950 | 1.5% |
| Rural unprotected land – available but not used | | |
| • unprotected forest/woodland | 26,321 | 28% |
| • suitable for cropping but unused | 7,000 | 7% |
| • grassland/bushland not suitable for cropping; may be suitable for grazing[4] (may include some water area) | 23,221 | 25% |
| Total land area | 94,536 | 100% |

Source: FAO/WB study (2003)

Second, apart from supporting land expansion and productivity improvements, the MKUKUTA and MDGs based interventions aim at reducing the many farm and market level constraints on smallholder producers. In particular, the following interventions will be accorded priority:

- Improving implementation of land tenure and reforms;
- Expanding agricultural research effort, and revamping research and extension to focus more closely on client responsiveness and engagement of farmers in the research process, and strong emphasis on sustainable use of land and water resources;
- Improving irrigation for smallholder and large scale producers; and
- Supporting improved functioning of output and input markets, and associated rural services, including access to finance.

[4] As much as 25% of potentially suitable additional pasture land is affected by tse tse fly and cannot be used for cattle at present.

However, for the high impact scenario to materialise, the most critical support under MKUKUTA and MDGs is fostering technological change by improving capacity for generation, dissemination, and adoption of appropriate techniques. The three elements must be present in the technology system to support increased productivity. New varieties that have proved success and profitable under smallholder conditions will be supported. In addition, efforts will be made to improve the environment for investment in private input supply networks (such as tractor hire stations), through access to lines of credit. Producers will be given information about the availability of the varieties and guidance on how to use them through stepped up extension services. A line of credit will be made available to cover the costs of early adoption of the new varieties and techniques, while ensuring that a broad range of technical options, including low cost ones, is available to farmers. An incentive package will be developed to entice extension staff to deliver quality services throughout the country, including greater access to housing and transport. Also, a new public-private partnership will be developed to ensure greater private investment in agriculture. Thus, all elements of the technology system, including the required knowledge and financing will be linked in a way that will provide smallholders access, countrywide.

Further, synergies will be explored and co-ordination stepped up to ensure complementarities and greater support for agricultural development. In particular, improved health is critical for the farmers and their families. The health sector will be encouraged to invest greater resources for improving rural health. Similarly, the roads sector will be encouraged to improve rural roads, both as a way of facilitating marketing of agricultural produce and opening up the rural sector for greater investment. The education sector will be encouraged to review and reform the entire education system to play a more critical role in enhancing the knowledge base of Tanzanian's – especially on issues related to their own development and international competitiveness. Other cross sectoral and crosscutting synergies such as HIV/AIDS, gender and environment will be analysed in detail and programmes developed to ensure smooth implementation of MKUKUTA.

As discussed above, an important strategy under MKUKUTA/MDGs is to raise agriculture productivity and incomes. In this regard, irrigation is expected to pay a vital role to ameliorate the erratic and often unreliable rainfall. Tanzania is well endowed with water, both on the surface and below ground water, but suffers nevertheless from water shortages due to insufficient capacity to store and access it. Cumulatively, the lakes, wetlands and aquifers provide huge natural storage capacity. The country also has 2.7 million hectares of wetlands (Usangu, Malagarasi). The total renewable water resource in Tanzania is estimated to be around 80 cubic km/year, of which 30 cubic km/year is ground water (FAO, 2004). Under MKUKUTA and MDGs, investments will be made to increase the area under irrigated agriculture.

In addition, support under MKUKUTA/MDGs will be provided for revamping agricultural marketing and producer prices. Agricultural marketing and intermediary costs have decreased over time as policy reforms during the 1990s reduced price interventions and eliminated monopoly purchases by Government bodies, thereby allowing greater scope for private sector trade and investment. However, a recent study suggests that marketing margins are still significant in relation to final prices, accounting for 30-50 percent of the border value (fob). The strategy envisaged under MKUKUTA is to reduce the margins so that farmers derive higher incomes from sale of their commodities.

Last, but not least, support will be provided for improving capacity at all level to enhance agriculture growth. This will entail developing responsive local government and national institutions that support local growth initiatives; improving local government technical capacity and finance to plan for agricultural growth; and increasing accountability and transparency in the use of available resources. Further, in order to enhance the efficacy of public spending in agriculture, it will be necessary to focus on core functions of public institutions in the agriculture sector, carry out results-based assessments of public expenditure, with expenditure increases focused on areas where there is a clear labour productivity and income enhancement payoff for smallholders. Also, additional policies will be designed to provide further incentives for domestic and foreign investment in the agricultural sector – though a review of the current Tanzania Investment Centre incentive scheme.

## 1.4 Agricultural Sector Reforms

Tanzania has undertaken structural and economic reforms since mid 1980s that has redefined the roles of public and private sector. In particular, under the new environment, most of the production, processing and marketing functions have been assigned to the private sector. The government has retained regulatory and public support functions. In addition, Agricultural Sector Lead Ministries (ASLMs)[5] have assumed new missions in which they see themselves as essentially performing public sector support functions, which among others include: research, extension, training, policy formulation, information services, regulatory functions, technical support, protection of environment and the provision of enabling environment for private sector participation in the agricultural production, processing and marketing.

### 1.4.1 The Agricultural Sector Development Strategy (ASDS)

The preparation of the ASDS in 2001 was the first step in the formulation of an Agricultural Sector Development Programme (ASDP) that will form the basis of GoT budget allocations and negotiations with Development Partners on their future support. Work on the programme has been completed and the ASDP is now in place. The vision of the ASDS is to have an agricultural sector that by year 2025 is *"modernized, commercial, highly productive, utilizes natural resources in an overall sustainable manner and acts as an effective basis for inter sectoral linkages"*. It is recognized that this will require transformation of the current subsistence-dominated production systems into commercial and profitable systems, hence have an agricultural sector that can contribute to growth and therefore able to reduce poverty.

Growth targets have been defined. Annual agricultural GDP growth will be raised to 6% by year 2005 – agricultural exports are envisaged to lead the growth with annual growth rate of 9%. The private sector is envisaged to lead the modernization and commercialisation by investing in research and extension, and marketing, while local government authorities (LGASs) will implement, co-ordinate and monitor ASDS implementation at district level. The following are the major components of the ASDS:

[5] Ministry of Agriculture, Food Security and Cooperatives; Ministry of Livestock Development; Ministry of Industry, Trade and Marketing; Ministry of Water Development; and Prime Minister's Office Regional Administration and Local Government.

- *Strengthening of the Institutional Framework: I*ncludes the clarification and strengthening of government's facilitating and regulatory roles. A training fund will be established to build capacity of central ministries, LGAs, stakeholders' organization and co-operatives

- *Agricultural research*: Privatisation of the cash crop research and institutionalisation of client-oriented research will be accelerated. GoT will change and improve the management of the National Research Fund. Funding of research will be shared among central government, LGAs, commodity boards and the private sector.

- *Agricultural Extension Services*: LGAs who are responsible for extension services will be using a number of approaches. With matching grants from a National Extension Fund, LGAs will contract private enterprises, NGOs and Sokoine University of Agriculture to provide services where this is commercially feasible. In contract farming/out grower schemes, LGAs may cost-share the provision of services. In other areas, where user payment is not an option, government will continue to deliver and finance the services.

- *Facilitating Investment:* LGAs in collaboration with the Bank of Tanzania, MCM and private sector agencies will promote a gradual establishment of a variety of Micro Finance Institutions (MFIs) on a demand basis. It is recognized that the establishment of viable MFIs will be agonizingly slow and, at times, risky and uncertain, but there is virtually no alternative. In addition, Government will through various incentives, promote contract farming and out grower schemes where farmers will be ensured inputs, advice and markets.

- *Markets for Inputs and Outputs:* It is planned to expand the Input Voucher System, used for some years by the coffee and tobacco industries, to other traditional export crops. To promote agribusiness and its linkage with small holders it is proposed to establish a Tanzania Agribusiness Development Centre (TADC) that will provide technical assistance on demand to private agribusiness enterprises. Government ownership and control of the commodity boards will be transferred to stakeholders. More importantly, however is the need to formulate an Agricultural Marketing Policy, which will guide the operations of agricultural marketing systems in Tanzania, ensuring coherence and avoid costly actions by various market participants.

- *Irrigation and Water Management:* The Ministry of Agriculture, Food Security and Cooperatives (MAFS) will prepare a National Irrigation Master Plan incorporating the principles of integrated soil and water management, emphasizing the use of low-cost approaches.

- *Rural Infrastructure:* Priority will be given to the transport needs of high potential districts. A demand-driven approach will be applied and District Rural Infrastructure Development Funds will be established with central government support to provide grants to match local community efforts.

- *Fiscal Burden/Incentives:* Efforts will be made to rationalize the taxation regime where currently tax, levies and fees on agriculture number about 55 and charges go to 50 percent of the farm-gate price.

### 1.4.2 The Agricultural Sector Development Programme (ASDP)

ASDP provides the operational means for implementing agricultural sector policies and strategies. The programme provides a single sector-wide approach, institutional and expenditure framework for agricultural development. In a nutshell, it is a "tool" for implementing the ASDS approved by Government in August 2001. Thus, the main objective of ASDP therefore is to achieve greater agricultural production, profitability and farm incomes that aim at achieving an increase in agricultural growth from the current 5 percent to 8 percent by 2007.

The main implementation strategy of ASDP is vested on the Agricultural Sector Lead Ministries (ASLM). These are: Ministry of Agriculture, Food Security and Cooperatives; Ministry of Livestock Development; Ministry of Industry Trade and Marketing; Ministry of Water Development; and Prime Minister's Office Regional Administration and Local Government.

The ASDP has three sub programmes and specific components at national and district level. These are:

1. Sub-programme A: Agricultural Investment and Implementation at District and Field level. Its main components are:
    - Investment and implementation through DADPs and DDPs,
    - Policy and regulatory framework supporting and enabling environment at Local Government Authorities (LGAs),
    - Research, advisory and technical services and training,
    - Private sector development, market development and agricultural finance, and
    - Crosscutting and cross-sectoral issues.

2. Sub-programme B: Agricultural Sector Support and the National Level. The main components are:
    - Policy, regulatory and institutional framework,
    - Research, advisory and technical services and training, and
    - Private sector development, marketing and agricultural finance.

3. Sub-programme C: Cross-cutting and cross-sectoral issues at national level. The main components are:
    - Cross-cutting issues: HIV/AIDS, gender, environment and good governance,
    - Cross-sectoral issues: Education, civil services, financial sector reform, land legislation, energy, water, and rural infrastructure.

Table 3: Agricultural Sector Development Programme Components

| Sub-programmes | Main Components | Proposed Sub-Components |
|---|---|---|
| A. Agricultural Sector Support and Implementation at District and Field Level | A.1 Investment and Implementation<br><br>The production and processing of agricultural outputs; indicative funding allocation: 70-80% of Sub-programme A | e.g. irrigation and water management; range management; livestock development and animal health; better land husbandry; crop production and protection; mechanization; storage and post-harvest; agro-processing |
| (through DADP/DDP) | A.2 Policy, Regulatory and Institutional Framework<br><br>Supporting enabling environment at LGAs for all farmers | • Policy and Regulatory framework<br>• *District institutions*<br>• *Community empowerment*<br>• *Agricultural information*<br>• *Advocacy* |
| (indicative funding allocation: 5%) | A.3 Research, Advisory Services and Training<br><br>establishing the support services needed for agricultural growth | • *Client-oriented research*<br>• *Animal and plant multiplication*<br>• *Advisory services*<br>• *Training of producers*<br>• *Service provider training* |
| | A.4 Private Sector Development, Marketing and Rural Finance<br><br>Supporting the commercialisation of agricultural growth | • Private sector development<br>• Market development and infrastructure<br>• Producer organizations<br>• Financial institutions and services |
| | A.5 Cross Cutting and Cross-Sectoral Issues<br><br>Managing links between Agriculture and other sectors | Managing links between agriculture and other sectors, may include amongst other:<br><br>*Rural infrastructure and energy; Civil service and LGA reform; Land Acts' implementation; Health (HIV/AIDS, Malaria); Gender; Education; Environmental management; Forestry and fisheries; Water* |
| B. Agricultural Sector Support at National Level | B. 1 Policy, Regulatory and Institutional Framework<br><br>Creating a national enabling environment for all farmers and other actors in the sector | • Policy & regulatory framework<br>• Commercial sub-sector development<br>• *Agricultural information*<br>• ASDP management and Secretariat<br>• Advocacy |
| (indicative funding allocation: 20%) | B.2. Research, Advisory Services, and Training<br><br>Establishing the basis for agricultural growth | • *Research*<br>• *Animal and plant multiplication*<br>• *Extension/Advisory services*<br>• *Training and education* |
| | B.3. Private Sector Development, Marketing and Rural Finance | • Marketing; Rural finance<br>• Private sector development |
| C. Cross-Cutting and Cross Sectoral Issues<br><br>(indicative funding allocation: 5%) | Managing links between agriculture and other sectors, may include amongst other:<br><br>Rural infrastructure and energy; Civil service and LGA reform; Land Acts' implementation; Health (HIV/AIDS, Malaria); Gender; Education; Environmental management; Forestry and fisheries; Water | |

In operationalising ASDP, several broad task forces, thematic working groups and investment-specific formulation teams have been established. These have broad government, private sector and development-partner representation. To-date four Task forces, thematic working groups and special studies have been launched and are operational. These include: Task Force 1 (TF-1) – Investment and implementation at district and field level. Task Force 2 (TF-2) – Policy, regulatory and institutional framework. Task Force 3 (TF-3) – Agricultural research, extension, training, technical services. Task Force 4 (TF-4) – Cross-cutting and cross-sectoral issues. Commendable progress has been made by each task-force to-date.

## 1.5 Synergies

Agricultural development is strongly influenced by a number of issues that are outside the mandate of the sector. Cross-sectoral and crosscutting issues include rural infrastructure development, energy, telecommunications, water and sanitation, land tenure, prevention and mitigation of the effects of HIV/AIDS and malaria, gender and youth and environmental management issues. These are discussed below.

*Rural Roads*

Infrastructure is an essential physical asset base for economic growth. An improved road network, including farm-to-market roads, will increase farmers' access to inputs and markets as well as value of farm produce. Among rural infrastructure, roads are key ingredients for crop development; poor roads limit farmers' access to market for input and crop produce. They also increase the cost of transportation of input and produce and hence reduce the net income of the farmers' and other stakeholders involved in crop production. Rural roads deliver goods and services required for agricultural production and carry the outputs to markets and processing facilities. Most district roads and feeder roads are in poor condition presenting a major constraint to improved agricultural productivity. Investments in rural roads will stimulate agricultural growth.

*Energy*

Most domestic fuel is from fuel wood having a big impact on agricultural production through household labour requirements and the environment. Only 1 percent of the rural population has access to electricity. Inadequate electrification in rural areas has hindered rural industrialization and agro-processing. Rural electrification is fundamental for value addition to agriculture products by processing agricultural produce closer to source of production.

*Telecommunication*

Telecommunication is a critical service to the agricultural sector because it eases information flow and facilitates timely availability of information. To facilitate management of out break pests and crop pests and diseases. Telecommunication provides opportunities for technology transfer through rural telecommunication centres.

*Water and Sanitation*

There is close link between water supply and water borne diseases such as cholera water based diseases such as bilharzias and water washed diseases such as scabies and trachoma in areas with poor sanitation.

*Land Tenure*

Uncertainty of tenure can be a significant obstacle to agricultural development. There have emerged conflicts between pastoralists, miners and agriculturalists on land use in some parts of the country causing serious problems and at times acting as a source of loss of life. The existing legislation is poorly understood and has yet to be applied in most parts of the country. Modernization of agriculture requires that land tenure system is favourable to long term investment. This involves measures that ensure long-term access and ownership of land by all categories of investors.

Mapping and surveying of land is a prerequisite to investment in large-scale production. Parcels of land for agriculture must be identified and surveyed ready for allocation to would be investors. Increasing the area under crop and livestock production is one of the key strategies for increasing production. The size of farms per household should be increased. To realize this, each household should be allocated a minimum size of a surveyed land for producing food and cash crops. Likewise, the area for agriculture and livestock production should be demarcated.

*HIV and AIDS and Malaria*

The HIV/AIDS pandemic has a devastating impact on agriculture. The disease targets the most economically active layers of the society and women are particularly vulnerable. The impact of the disease on production, rural poverty and livelihood is catastrophic in certain communities. The prevalence of HIV/AIDS and Malaria cases are on the increase and seriously eroding the availability of active labour force in agriculture. The high costs for health care of victims of the pandemic are consuming household savings leading affected households becoming poorer. The disease also leaves behind skill gaps as adults die before passing down their farming and management skills. There is also increasing dependence on widows, orphans and elderly people which make affected families to resort to less labour intensive crops of poor nutritional status such as cassava.

Malaria kills about 100,000 Tanzanians every year and its debilitating effect has a significant impact on rural productivity. Water borne diseases also debilitate and kill many farmers and the interaction between the two is pronounced in irrigation schemes and areas of seasonal flood agriculture and in areas with high agricultural potential.

*Natural Resource Base and Environmental Degradation*

Unsustainable utilization of production resources may result into many environmental problems including land degradation, desertification, deterioration of aquatic systems, widespread pollution from improper handling and inappropriate use of agrochemicals, livestock drugs and fertilisers. Further, the environment is degraded through overgrazing, poor cultivation practices, bush fires, overexploitation of forests and invasion by exotic organisms. This may result into rapid reduction of biological and land

productivity. Environmentally destructive fishing such as the use of explosives, excessive trawling, and chemical poisoning and small mesh size nets often leads to irreversible destruction of marine biodiversity and habitats.

*Gender*

In principle, existing laws provide for equal rights and privileges to both men and women. However, their interpretation through common laws and social conventions often leads to difficulties and their being compromised. Women contribute 60 to 80 percent of labour in agricultural production and contribute the largest proportion of the labour in reproductive household activities. Typically, women work longer hours than men. This contributes to their poorer health and nutritional status and to high maternal mortality. Men, who are traditionally considered heads of households, have greater access to land, credit and extension services. In schools, girl dropouts make them proportionally less educated than boys. Based on these observations, it is clear that traditional interventions for agricultural development are likely to affect men and women differently. An effective gender approach in designing and implementing interventions in agriculture would take these differences into consideration focusing on equality and equity of the outcomes rather than just equal treatment.

*Good Governance*

The Tanzania Development Vision 2025, Rural Development Strategy and the National Strategy for Reduction of Poverty (NSGRP) emphasize the importance of good governance in achieving national goals of sustainable development and poverty reduction. Poor leadership, weak administration, lack of accountability and transparency are frequently identified problems.

# 2.0 REVIEW OF PREVIOUS COSTING APPROACHES IN THE AGRICULTURE SECTOR

## 2.1 Introduction

The Government of Tanzania approved the National Strategy for Growth and Reduction of Poverty (NSGRP) also know as MKUKUTA in early February 2005. MKUKUTA is a Medium –Term Strategy for poverty reduction that focuses on implementing the country's vision 2025 and the MDGs 2015. The Government through the Vice President's Office (VPO) has prepared implementation framework for MKUKUTA. The implementation of MKUKUTA is scheduled to start in FY 2005/06.

Agriculture is one of the five sectors selected to undertake MKUKUTA costing on a pilot basis. Other sectors include education, health, water and works. The costing exercise will be undertaken in the context of MKUKUTA implementation framework. The primary purpose of costing of MKUKUTA is to align the national budget, agricultural sector plans, local government plans and foreign aid with MKUKUTA targets.

As we are all aware, agriculture is the lifeblood of the Tanzanian economy. It accounts for 50% of GDP; over 75% of employment; over 60% of foreign exchange earnings; and is the main source of food for Tanzanians. Therefore thorough implementation of interventions in agriculture is critical for Tanzania's growth prospects.

## 2.2 Costing methodology under the Agriculture Sector Development Strategy/ Programme (ASDS/ASDP)

### 2.2.1 Costing under ASDS/ASDP

The costing of the agriculture sector is based on the ASDS framework. The ASDS/ASDP costing is based on strategic areas that are further linked to the goal, purpose and strategic objectives of the agricultural sector. In particular, in 2001 the government developed indicative costing for implementation of ASDS. Unit cost for main interventions were identified and used to estimate the total cost. The results of the costing are as follows:

Table 2.1: Indicative Costs of Implementing the ASDS

| Strategic Area (Output) | US $ million | Tshs, billion |
|---|---|---|
| 1. Strengthening the institutional framework | 34.2 | 35.9 |
| - LGAs capacity strengthened | 23.2 | 24.4 |
| 2. Creating a favourable environment for commercial activities | 9.4 | 9.8 |
| 3. Public and private roles in improving supporting services | 160.9 | 168.1 |
| - Client-oriented and collaborative agricultural research institutionalised | 45.2 | 47.5 |
| - Demand driven agricultural extension in place | 45.4 | 47.7 |
| - Animal health and crop protection services improved | 27.0 | 28.4 |
| - Management and utilization of land and water services improved | 28.9 | 30.3 |
| 4. Strengthening marketing efficiency for inputs and outputs | 42.5 | 44.6 |
| - Increasing access to inputs in rural areas | 25.0 | 26.3 |
| 5. Mainstreaming planning for agricultural development in others areas | 8.3 | 8.7 |
| Total | 255.3 | 268.1 |

### 2.2.2 Costing under Agriculture sector Public Expenditure Reviews (PER) and Medium term Expenditure Framework (MTEF)

The Government has undertaken three PERs for the agriculture sector: 2001/02, 2002/03 and 2003/04. The PER/MTEF approach to costing is based on identifying priority interventions to achieve sector's set targets, identification of unit cost of inputs required to implement earmarked interventions and eventually deriving total cost of interventions.

Table 2.2: PER/MTEF estimated non-PE costs of implementing the agriculture activities over the 5 years 2002/03-2006/7 in US$'000[a]

| No. | Sub-programme | MAFC | MLD | M[6] | TOTAL |
|---|---|---|---|---|---|
| 1 | Institutional support | 1,358 | 3,910 | 8,868 | 46,751[b] |
| 2 | Commercial sector support | 8,530 | 4,363 | 487 | 13,679[c] |
| 3 | Cooperative promotion | | | 1,222 | 1,222 |
| 4 | Agro-mechanization | 1,069 | | | 1,069 |
| 5 | Agro-processing | 729 | 570 | | 1,299 |
| 6 | Agricultural extension | 17,669 | 23,585 | | 41,254 |
| 7 | Crop protection | 5,625 | | | 5,625 |
| 8 | Agricultural research | 17,159 | 14,293 | | 31,453 |
| 9 | Agricultural training | 8,158 | 7,886 | 3,705 | 19,749 |
| 10 | Soil conservation and soil fertility | 2,001 | | | 2,001 |
| 11 | Irrigation and water management | 6,845 | | | 6,845 |
| 12 | Agricultural information | 3,260 | 3,657 | 1,860 | 8,778 |
| 13 | Post-harvest management | 618 | | | 618 |
| 14 | Range development and management | | 13,192 | | 13,192 |
| 15 | Animal health | | 30,541 | | 30,541 |
| 16 | Agricultural financing | | | 1,333 | 1,333 |
| 17 | Cooperative inspectorate | | | 549 | 549 |
| 18 | Agricultural inputs | 3,199 | 3,180 | 191 | 6,570 |
| 19 | Marketing infrastructure | | 9,234 | 53 | 9,287 |
| 20 | Contract farming | 965 | 709 | | 1,674 |
| 21 | Rural infrastructure identification | | | | 265[d] |
| 22 | Cross-cutting issues | 87 | | | 1,768 |
| | Total | 77,272 | 115,120 | 18,268 | 245,522 |

Source: URT Agriculture Sector Lead Ministries (2002) Agricultural Sector Development Programme Draft Sub-Programme Document 8 April 2002.

Notes: a. Costs estimated in Tshs at January 2002 prices converted at Tshs980 = US$ 1.
b. Of this total, US$32,272 thousand is allocated to PO-RALG for LGA capacity building and US$342 thousand is allocated for ASDP coordination.
c. PO-RALG has expenditure of US$299 thousand in this sub-programme.
d. PO-RALG is responsible for this sub-programme.

6 Marketing Interventions

Table 2.3: MTEF /Budget Allocation of Funds to the Agricultural Sector Ministries Tshs. Million

CROP INTERVENTIONS FOR YEAR 2005/2006

1. Agricultural Irrigation - 8.3 billion shillings
2. Strategic Grain Reserve purchases - 8.2 billion shillings
3. Fertilizer and cashew nut chemicals - 8.0 billion shillings
4. Subventions to Ministry Parastatals - 5.6 billion shillings
5. Research and Crop Development - 4.0 billion shillings
6. Input Trust Fund - 3.9 billion shillings
7. Plant Protection - 2.0 billion shillings
8. Subventions to International Organizations - 1.2 billion shillings
9. Extension Services - 3.0 billion shillings

Table 2.4: Budget trends

| RECURRENT BUDGET | 2004/2005 (Million Tshs) | 2005/2006 (Million Tshs) | Percentage Change |
|---|---|---|---|
| Other charges (OC) | 28.534 | 46.019 | 61.3 |
| Personnel Emolument (PE) | 4.527 | 5.352 | 18.2 |
| Parastatal PE | 1.951 | 3.263 | 70.4 |
| SUB TOTAL | 24.976 | 54.635 | 56.2 |
| DEVELOPMENT BUDGET | | | |
| Local | 6.436 | 7.440 | 15.6 |
| Foreign | 22.661 | 56.050 | 147.3 |
| Sub-Total | 29.097 | 63.490 | 118.2 |
| Total | 64.974 | 118.124 | 84.4 |

MARKETING AND CO-OPERATIVES INTERVENTIONS FOR YEAR 2005/2006

Allocation of funds on priority basis

1. Administration and General - 2.0 billion shillings
2. Policy and Planning - 1.1 billion shillings
3. Co-operation Development - 1.2 billion shillings
4. Subventions to Ministry Parastatals - 1.7 billion shillings
5. Marketing Development - 1.1 billion shillings

Table 2.5: Budget Trends

| RECURRENT BUDGET | 2004/2005 (Million Tshs) | 2005/2006 (Million Tshs) | Percentage Change |
|---|---|---|---|
| Other charges (OC) | 3.326 | 4.906 | 47.5 |
| Personnel Emolument | 0.425 | 0.494 | 16.6 |
| Parastatal PE | 3.585 | 4.770 | -50.6* |
| SUB-TOTAL | 7.336 | 7.170 | -2.3 |
| DEVELOPMENT BUDGET | | | |
| Local | 0.169 | 0.169 | 0 |
| Foreign | 0.379 | 0.342 | -.9.8 |
| Sub Total | 0.548 | 0.511 | -6.8 |
| Total | 7.884 | 7.681 | -2.6 |

- The decrease in Parastatal PE is because the budget of the former Cooperative College Moshi) now the Moshi University College of Cooperative and Business Studies – MUCCOBS) has been transferred to the Ministry of Science, Technology and Higher Education.

LIVESTOCK INTERVENTIONS FOR YEAR 2005/2006

Allocation of funds on priority basis

| | | | |
|---|---|---|---|
| 1. | Animal Health | - | 2,024,550,000 |
| 2. | Livestock Extension | - | 1,275,600,000 |
| 3. | Livestock Research | - | 1,570,470,000 |
| 4. | Livestock Training | - | 1,085,880,000 |
| 5. | Livestock Marketing Infrastructure | - | 1,008,000,000 |
| 6. | Range Development and Management | - | 967,400,000 |
| 7. | Livestock Inputs | - | 633,450,000 |
| 8. | Livestock Information | - | 81,800,000 |
| | Total | - | 9,257,100,000 |

Table 2.6: Budget trends

| RECURRENT BUDGET | 2004/2005 | 2005/2006 | Percentage Change |
|---|---|---|---|
| Other charges (OC) | 5,467,423,200 | 7,143,000,000 | 30 |
| Personnel Emolument | 1,846,372,400 | 2,175,924,000 | 17 |
| SUB TOTAL | 7,343,795,000 | 9,318,924,000 | 26 |
| DEVELOPMENT BUDGET | 2004/2005 | 2005/2006 | Percentage Change |
| Local | 959,600,000 | 2,114,000,000 | 120 |
| Foreign | 1,932,900,000 | 654,200.000 | -66 |
| Sub Total | 2.892.500.000 | 2,7687,200,000 | -4 |
| Total | 102,362,956,000 | 120,871,240,000 | 18 |

Table 2.7: Agriculture Sector Budget Trend

| RECURRENT BUDGET | 2004/2005 (Million Tshs) | 2005/2006 (Million Tshs) | Percentage Change |
|---|---|---|---|
| Other charges (OC) | 37.327 | 58.068 | 55.6 |
| Personnel Emolument (PE) | 6.867 | 9.022 | 16.8 |
| Parastatal PE | 5,500 | 5.033 | -8.5 |
| SUB-TOTAL | 49.694 | 71.123 | 43.1 |
| DEVELOPMENT BUDGET | | | |
| Local | 7.565 | 9.723 | 2.9 |
| Foreign | 24.973 | 57.046 | 128.4 |
| Sub Total | 32.538 | 66.769 | 105.2 |
| Total | 82.232 | 137.892 | 67.7 |

Source: Ministry of Finance and MTEF Budget Guidelines 2002/3 -2004/05

Major interventions identified in PER 04 include the following:

1. *Crop sub-sector*

- Sub-programme A: District based interventions
  - Promotion of Participatory Extension and Farmer Field Schools
  - Irrigation & water management

- Sub-programme B: Implementation at national level
    - Strengthen sub-sector regulatory and Institutional Capacity
    - Promote client oriented agricultural research & extension
    - Irrigation development, soil water management
    - Support agricultural training
    - Review and update sub-sector policies, programmes and capacity building
    - Strengthen the capacity for agricultural information management and advocacy
    - Access to inputs, farm implements and agricultural credit

*2. Marketing & Cooperatives sub-sector*

- Sub programme A: District based activities
    - Capacity building of cooperative society
    - Capacity building to market monitors, data collection, processing and interpretation
    - Sensitise on importance of quality setting and standards

- Sub-programme B: Implementation at national level
    - Strengthen market and cooperative regulation
    - Promote formation and registration of rural groups
    - Provide specialized skills and services

*3. Livestock sub-sector*

- Sub-programme A: District based
    - Construction and rehabilitation of waterdams/charcos
    - Construction of infrastructure for control of livestock diseases and maintenance

- Sub-programme B: Implementation at the national level
    - Harmonize cross border disease control measures
    - Animal production including artificial insemination
    - Provision of extension and advisory services
    - Strengthen regulatory and institutional capacity
    - On farm participatory technology development
    - Provide specialized skills

*4. Costing methodology under the World Bank Millennium Development Goals (MDGs)*

The MDG cost estimate has the goal of eradicating poverty and hunger. The target is to half the proportion of people who suffer from hunger between 1990 and 2015. The main actions include:

- Increasing agricultural productivity
- Supporting other rural income generating activities, and
- Promoting nutrition

The MDG identified several agriculture-related interventions:

- Improving soil fertility
- Improving access to agricultural inputs
- Small-scale water management
- Increasing research and extension
- Improving storage facilities
- Value addition through agro-processing facilities
- Improving marketing facilities

The MDG then made an estimation of the resources required to reduce poverty and end hunger by determining the unit costs of those interventions. The unit costs were obtained from local experts. The main assumption made in calculating the costs is to be able to reach 80% of the rural population. The results of their methodology shows that the cost of increasing agricultural productivity is US $ 1.4 billion (over Tshs 1.4 trillion) over the 11 year period increasing from US $ 83million (over Tshs 83 billion) in 2005 to US$ 165 million (over Tshs 165 billion) by 2010. The costs declined significantly from US$ 165 million in 2010 to US$ 76 million (over Tshs 76 billion) in 2015 which is a reflection of the fact that agricultural interventions over a five year time frame yields significant increase in food production.

*5. Lessons learned*

1. The costing methodologies reviewed make several assumptions about targets to be met in costing agriculture. The proposed agriculture costing used targets set under the MKUKUTA document. These are: GDP growth of 6-8% per annum by 2010; growth of agriculture from 5% in 2002/03 to 10% in 2010; increased growth rate of livestock sub-sector from 2.7% in 2000/01 to 9% by 2010; increased food crops production from 9 million tons in 2003/04 to 12 million tons in 2010; and maintenance of Strategic Grain Reserves of at least 4 months of national food requirement. Other assumptions such as growth of agriculture productivity will be made depending on the intervention whose cost is being estimated.

2. The methodologies reviewed identified key interventions in the agriculture and livestock sector that were used in the costing. The MKUKUTA costing exercise also made a thorough identification of main interventions needed to achieve MKUKUTA targets and goals.

3. The methodologies reviewed identified unit costs of the interventions and applied them to the interventions to obtain resources needed to achieve targets/goals. The proposed MKUKUTA costing methodology also identified unit costs and suitably applies them to the interventions to obtain total resource requirements.

4. Finally, although MKUKUTA implementation resources are limited, the costing tried to estimate the level of resources needed to achieve targets regardless of resource limitations. However, the MKUKUTA financing plan will try as much as possible to identify possible realistic amount of local and foreign resources based on historical sector funding analysis, then make several assumptions regarding improved private/public partnerships and local community participation to raise more funds in order to eliminate any resource gaps.

# 3.0 METHODOLOGY AND PROCESS FOR COSTING AGRICULTURE INTERVENTIONS UNDER MKUKUTA/MDGS[7]

## 3.1 Purpose

The primary purpose of estimating the price tag of MKUKUTA - MDGs is to align the national budget, sectoral plans, local government plans and foreign assistance with the MKUKUTA targets. Based on this purpose the costing exercise will be undertaken in the context of MKUKUTA implementation framework. The MKUKUTA costing will also be addressed with humility, flexibility and from a point of view of learning to feed into future plans and strategies.

## 3.2 Objectives of MKUKUTA Based MDGs Costing

The MKUKUTA based MDGs costing primarily assesses the needs and costing of implementing MKUKUTA intervention and of reaching the MDGs. It will clearly define what resources will be required to meet the targets. This is important because of the following reasons:

- To assess needs and cost of implementing MKUKUTA. This exercise is aimed at estimating the amount of resources required to implement the strategy for a period of five years (2005 – 2010) and the period covered under MDGs (2006-2015);
- To identify cross-sectoral areas, needs and synergies in MKUKUTA;
- To develop capacity for needs assessment. Institutionalisation of needs assessment in Government Ministries and Departments will require building capacity in order to implement the MKUKUTA effectively and efficiently;
- To align and harmonise MKUKUTA, PER/MTEF and JAS. These key processes require well-balanced sequencing and linkages; and
- To produce a snap shot of a long-term strategy 2005 – 2015 building on MKUKUTA. Outline the key policies, institutions, and investments needed to achieve targets by 2015.

## 3.3 Key Assumptions and Costing Methodology

In order to achieve the objectives mentioned above, the MKUKUTA based costing makes several assumptions and methodology was as follows:

1) Cost estimates were made within the MKUKUTA context – based on strategic policy options and choices for prioritising the ways and means of realising the MKUKUTA (MDG) goals and objectives related to agriculture.

[7] Agriculture means both crops and livestock.

2) Costing work followed a participatory process that was driven by the sectors and key stakeholders, supported by experts;

3) Costing was assumed financially unconstrained. In other words costs were not based on current or past resource allocations to the agriculture sector. Rather, the costs reflect resources required to achieve MKUKUTA and MDGs targets.

4) All costs are in USD equivalent exchange rate for year 2005. The exchange rate used: 1100 Tshs/USD.

5) Costing work used component analysis. This methodology had seven main steps, namely:

- Reviewing and analysing each main crop and livestock and support activities (such as research and extension) to determine performance (in the past 5-10 years) – Example: location, area cultivated, average yield, returns (revenue from sales), etc.;
- Identifying main constraints/problems for each main crop and livestock and other agriculture support activities;
- Identifying main interventions that if implemented under MKUKUTA/MDGs would reduce or eliminate the constraints/problems. This also entailed estimating the impact of each intervention, where necessary.
- Projecting growth/production of each of the main crop and livestock – by using historical yield/production behaviour and known yield potential for each main crop and livestock, suitably adjusted to ensure MKUKUTA/MDGs targets would be met.
- Projecting other intervention requirements that are essential for achieving MKUKUTA/MDGs targets.
- Determining the unit cost of each intervention using average market rates/prices.
- Projecting resource requirements by multiplying unit costs with each of the respective intervention over the period up to 2015.

## 3.4 Process used in undertaking the costing exercise

The process methodology used in costing the agriculture sector followed a step-wise consultative approach that involved the Government first with the Vice President's Office (VPO) and now the Ministry of Planning, Economy and Empowerment (MPEE), all Agriculture-related Sector Ministries, Non-government organisations and civil society as a whole. The following process was followed:

- Identification and selection of two full-time Ministry of Agriculture officials to participate fully in the costing exercise in active collaboration with the external consultant. The active involvement of the officials provided an opportunity for capacity building in the Ministry.

- Formation of sector working group that comprised of all Agriculture Lead Ministries (ALMs). The ASLM were: Ministry of Agriculture, Food Security and Cooperatives; Ministry of Livestock Development.; Ministry of Industry, Trade and Marketing; Ministry of Water Development; and Prime Minister's Office Regional Administration and Local Government..

- Taking stock of what has been accomplished in agriculture in terms of costing under PER/MTEF Process, ASDP, and World Bank Millennium Development Goals (MDGs).

- Involving stakeholders in one-day participatory discussions on agriculture needs assessment and consultations. The seminar/workshop involved 43 participants from Government Ministries, NGOs, Dar es Salaam and Sokoine universities, civil society organisations such as TGNP and REPOA and Donor representatives.

- Involving stakeholders in a National multi-sectoral seminar/workshop to introduce and adapt the needs assessment and costing approach.

- Involving stakeholders in a one-day seminar/workshop to discuss and explain the interventions and costing and suggest improvements, including alternative approaches.

- Reviewing draft costing report by all Agriculture Lead Ministries and incorporating valuable comments to the report.

- Producing a final draft that is truly participatory, that if implemented will go a long way in transforming the agriculture sector and fostering poverty alleviation.

# 4.0 AGRICULTURE INTERVENTION ACTION PROFILES

This section provides a brief summary of the main crops, livestock and other agricultural related activities such as irrigation, research and extension services. The main objective is to provide a summary of the component current status, main constraints and proposed actions under MKUKUTA/MDGs. Where applicable, projections are made to inform growth of each component that is consistent with attaining the MKUKUTA/MDGs targets up to 2015.

## 4.1 Food Crops

### 4.1.1 Maize

*Introduction*

White maize is the major food staple in Tanzania. Maize is consumed in both urban and rural areas. About half of Tanzanian small farmers produce maize. Maize production has increased from about 630,000 tons in 1964/65 to over 3,300,000 tons in 2004/05. Yields per hectare have remained low, about 1.8 tons. The main constrains facing maize production include: unpredictable weather conditions, inadequate and untimely supply of inputs (especially improved seeds and fertiliser), poor pest and disease control methods, and large post-harvest losses due to inadequate or poor storage facilities (25-30% losses are common). Low cultivable area is associated with low use of mechanisation – especially the use of the hand hoe. Thus, the rationale for supporting maize under MKUKUTA is to improve maize production by increasing yields per hectare and expanding land under cultivation and reducing unwarranted post-harvest losses in order to assure food security for the nation and surplus for export.

*Actions under MKUKUTA/MDGs*

Several actions are proposed under MKUKUTA. The main interventions are: improving yields through wider access to improved seed; expanding cultivable area through greater use of tractors and animal traction, selective application of natural and artificial fertilizer; storage improvement; reduction of pests and diseases and processing to improve marketability of the product.

Table 4.1: Maize Projections and Impact

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Average/ year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maize ('000Ha) | 1868 | 1962 | 1975 | 2042 | 2096 | 2149 | 2203 | 2256 | 2310 | 2363 | 2417 | 2149 |
| Maize (yields, tons/ha) | 1.8 | 1.9 | 2.1 | 2.5 | 2.7 | 2.9 | 3.2 | 3.4 | 3.7 | 3.9 | 4.1 | 2.9 |
| Total production ('000 tons) | 3362 | 3728 | 4148 | 5105 | 5659 | 6232 | 7050 | 7670 | 8547 | 9216 | 9910 | 6421 |
| Reduction in loss % | 25 | 24 | 22 | 17 | 16 | 13 | 10 | 8 | 5 | 3 | 3 | 13 |
| Number of farmers reached % | 45 | 50 | 54 | 59 | 63 | 68 | 72 | 77 | 81 | 86 | 90 | 69 |

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Average/ year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Incremental quant.maize processed (60% of prod.in '000MT) | 2017 | 2237 | 2489 | 3063 | 3396 | 3739 | 4230 | 4602 | 5128 | 5529 | 5946 | 3852 |
| Employment generated (4 people/sheller) | 5000 | 5360 | 5720 | 6080 | 6440 | 6800 | 7160 | 7520 | 7880 | 8240 | 8600 | 6800 |
| No. of hours saved by women (in '000 at1hour/20kg processed) | 98 | 112 | 124 | 153 | 168 | 188 | 209 | 231 | 253 | 276 | 300 | 192 |

Notes

- Component implementation actions will start in fiscal year 2006/07 and be implemented for 9 years to 2015. The first 5 years comprise the MKUKUTA first phase implementation schedule.
- Area under maize is expanded by 18% by 2010 and by 32% by 2015. Yields are improved through use of high-yielding seeds, pest and disease control and strategic use of fertilisers, by 77% by 2010 and tripled by 2015. As a result, maize production is increased by 85% by 2010 and by 90% by 2015.
- Strategic fertiliser use increases by 39% by 2010 and by 72% by 2015.
- The processing capacity for engine powered maize sheller is 1000 kg/hour.
- Regional and zonal offices will encourage private businesses to purchase maize shellers and grain mills through a line of credit.
- Improved Model storage facilities using locally available materials will be designed, developed and demonstration on use undertaken by NHBRA (National Housing and Building Research Agency).
- Training of staff and farmers will be provided through the component of extension services.
- Increased processing is expected to create an average of 6800 jobs per year and reduce women manual processing load by an average of 192,000 hours.

### 4.1.2 Cassava

*Introduction*

Cassava is a drought resistant crop that flourishes almost all over Tanzania. The area under cultivation has increased from about 599,000 hectares in 1996/97 to over 875,000 hectares in 2004/05. Production has also increased to about 2.0 million tons by 2004/05. Cassava yields per hectare has remained almost stagnant at about 2 tons per hectare. The rationale for supporting this crop is that it offers more dependable food source and cash than maize in less reliable rainfall areas of Tanzania. Given the nature of Tanzania's unreliable rainfall pattern, it is essential that these crops are widely grown for subsistence use and that attention is given to making drought stable products available to consumers in more acceptable forms, such as cassava flour and composite flour combined with wheat for the domestic and international market. Support to this crop is consistent with MDG goals of ending hunger and National Vision 2025 of ensuring food security for all Tanzanians.

*Actions under MKUKUTA/MDGs*

Several actions are proposed under MKUKUTA. These are: improvement of pest control; variety improvement and planting material distribution, area expansion, and improvement of crop husbandry technology and facilitating industrial applications. Another action would be to support commercialisation of the crop by providing a line of credit to improve drying using cement grounds and tarpaulins, processing and storage to make the product more suitable, durable, palatable and attractive. Other support would be to promote the use of inexpensive mechanical clippers to handle the dried product, in which form it is attractive for use in feed mixes or for the export market.

Table 4.2: Cassava Projections and Impact

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cassava ('000ha) | 875 | 882 | 890 | 897 | 905 | 912 | 920 | 927 | 935 | 942 | 950 |
| Cassava (yields, tons/ha) | 2.3 | 2.5 | 2.8 | 3 | 3.3 | 3.5 | 3.8 | 4 | 4.3 | 4.5 | 4.8 |
| Total production ('000 tons) | 2013 | 2205 | 2492 | 2691 | 2987 | 3192 | 3496 | 3708 | 4021 | 4239 | 4560 |
| Reduction in loss % | 20 | 16 | 13 | 9 | 6 | 2 | 2 | 2 | 2 | 2 | 2 |
| Number of farmers reached % | 20 | 25 | 35 | 42 | 49 | 57 | 64 | 68 | 72 | 76 | 79 |
| Incremental quant.cassava processed (40% of prod.in '000MT) | 805 | 882 | 997 | 1076 | 1195 | 1277 | 1398 | 1483 | 1608 | 1696 | 1824 |
| Employment generated (4 people/clipper) | 560 | 920 | 1200 | 1533 | 1853 | 2173 | 2493 | 2813 | 3133 | 3453 | 3773 |
| No. of hours saved by women (in '000 at1hour/20kg processed) | 22 | 30 | 36 | 43 | 50 | 57 | 63 | 70 | 77 | 84 | 91 |

Notes

- Component implementation actions will start in fiscal year 2006/07 and be implemented for 9 years to 2015. The first 5 years comprise the MKUKUTA first phase implementation schedule.
- Area under cassava will be increased by 4% by 2010 and by 8.5% by 2015. Improved crop husbandry including introduction of more disease-resistant cassava stock is expected to increase yields by 52% by 2010 and double current yield level by 2015. As a result, cassava production is expected to increase by 58% by 2010 and more than doubled by 2015.
- The processing capacity for manual chipper is 60-70 kg/hour; for chipper/crater powered is 500kg/hour.
- Amount of cassava processed in hygienic conditions is expected to increase by 74% by 2010 and double current processing level by 2015.
- Jobs created are expected to rise from 2,500 by 2010 to over 4,000 jobs by 2015 as a result of increased processing capacity.
- Processing is expected to reduce workload of women and save 63,000 hours by 2010 and 98,000 hours by 2015.
- Regional and zonal offices will encourage private businesses to purchase chippers through a line of credit.
- Cassava variety improvement using already known good performers is expected to be replicated in other areas with similar conditions, through scaled up extension and research services.

### 4.1.3 Sorghum and millet

*Introduction*

Sorghum and millet are drought staples. In 2004/05 Tanzania had about 980,000 hectares under sorghum and millet, producing about 861,000 tons. Yields per hectare are low, averaging less than one ton per hectare. The rationale for supporting these stables is that they offer more dependable food source and cash than maize in less reliable rainfall areas of Tanzania. Given the nature of Tanzania's unreliable rainfall pattern, it is essential that these crops are widely grown for subsistence use and that attention is given to making drought stable products available to consumers in more acceptable forms, such as sorghum flour and composite flour combined with wheat for the domestic and international market. Support to these staples is consistent with MDG goals of ending hunger and National Vision 2025 of ensuring food security for all Tanzanians.

*Actions under MKUKUTA/MDGs*

Several actions are proposed under MKUKUTA. The first is upgrading and commercialising the seed multiplication and distribution system. The second is to expand area under cultivation. The third is to promote sorghum/millet hullers – the small units for villages predominated by red varieties of sorghum and larger units for animal feed and brewing industries. The forth is to promote the production of composite flours for human consumption. The strategy is to encourage the private sector to carry out needed investment through own cash or using a credit facility to be established. The actions under this component focus on improving the capacity of regional and zonal agricultural-related institutions to undertake orderly and efficient development of these drought resistant staples.

Table 4.3: Sorghum and Millet Projections and Impact

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Av/year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sorghum ('000 ha) | 630 | 635 | 642 | 648 | 654 | 660 | 666 | 672 | 678 | 684 | 690 | 7259 | 660 |
| Sorgum (yields, tons/ha) | 0.7 | 0.9 | 1.5 | 1.8 | 2.2 | 2.6 | 3 | 3.4 | 3.8 | 4.2 | 4.6 | 28.7 | 2.61 |
| Total production ('000 tons) | 441 | 572 | 963 | 1166 | 1439 | 1716 | 1998 | 2285 | 2576 | 2873 | 3174 | 19203 | 1746 |
| Millet ('000 ha) | 350 | 358 | 363 | 370 | 377 | 383 | 390 | 396 | 403 | 409 | 416 | 4215 | 383 |
| Millet (yields, tons/ha) | 1.2 | 1.2 | 1.5 | 1.8 | 2.1 | 2.4 | 2.7 | 3 | 3.3 | 3.6 | 3.9 | 26.7 | 2.43 |
| Total production ('000 tons) | 420 | 430 | 545 | 666 | 792 | 919 | 1053 | 1188 | 1330 | 1472 | 1622 | 10437 | 949 |
| Reduction in loss % (Sorghum) [1] | 30 | 28 | 25 | 23 | 20 | 18 | 15 | 13 | 10 | 8 | 5 | 195 | 17.7 |
| Reduction in loss % (millet) | 30 | 28 | 25 | 23 | 20 | 18 | 15 | 13 | 10 | 8 | 5 | 195 | 17.7 |
| Number of farmers reached % | 45 | 48 | 52 | 55 | 59 | 62 | 66 | 69 | 73 | 76 | 80 | 685 | 62.3 |
| Incremental quant cereals processed (40% of prod.,MT) | 168 | 172 | 219 | 268 | 318 | 369 | 423 | 477 | 534 | 592 | 651 | 4191 | 381 |
| Employment generated (4 people/huller/mill) | 108 | 160 | 200 | 248 | 294 | 340 | 386 | 432 | 478 | 524 | 570 | 3740 | 340 |
| No. of hours saved by women (in '000 at1hour/10kg processed) | 17 | 17 | 22 | 27 | 32 | 37 | 42 | 48 | 53 | 59 | 65 | 419 | 38.1 |
| 1 [1] (i) Processing traditionally is wasteful. (ii) Storage loss is high | | | | | | | | | | | | | |

Notes

- Component implementation actions will start in fiscal year 2006/07 and be implemented for 9 years to 2015. The first 5 years comprise the MKUKUTA first phase implementation schedule.
- Yields of sorghum and millet will be tripled from their current average level of 0.7 and 1.2 per ton, respectively, to their potential of 5.0 and 4.0 per ton by 2015 through better crop husbandry and improved seeds. Area cultivated will also increase by about 10-20% by 2015. As a result of area expansion and yield improvement, overall production is expected to rise progressively to between 20-25% by 2015.
- The processing capacity for dehullers (although finally will depend on the hammer mill) is 500 tons/year.
- Regional and zonal offices will encourage private businesses to purchase dehullers and hammer mills through a line of credit.
- Model storage facilities using locally available materials will be designed, developed and demonstration on use undertaken by NHBRA (National Housing and Building Research Agency). 7
- On-farm improved processing will create an additional 340 jobs per year and save about 38,000 hours of women that would have been used in manual processing.

### 4.1.4 Wheat

*Introduction*

About two-thirds of wheat production in Tanzania is grown on large-scale farms – the rest being produced by a few smallholders. Area under wheat production has declined sharply from about 99,400 hectares in 1997/98 to about 35,300 hectares in 2004/05. As a result, production has fallen from about 111,500 tons in 1997/98 to 53,000 tons in 2004/05. Yields per hectare, however, have remained nearly stagnant at about 1.2 tons per hectare in the past decade. The main constrains facing wheat production include: inadequate access to credit for expansion of area under production, inadequate farm inputs and machinery, and absence of suitable technical packages for smallholder farmers. The rationale for supporting wheat under MKUKUTA is to increase wheat production in order to raise the level of national food self-sufficiency and increase supply for the export market, especially the Eastern and Southern African market.

*Actions under MKUKUTA/MDGs*

Several actions are proposed under MKUKUTA. The main interventions are: improving availability of farm machinery and equipment through a line of credit and tractor-hire services; assisting small-holder farmers in the technology of growing wheat, reducing post harvest losses and controlling pests and diseases.

Table 4.4: Wheat Projections

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Av/year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wheat ('000 Ha) | 35.3 | 36.5 | 38 | 42.5 | 45 | 48 | 51 | 54 | 57 | 60 | 63 | 530 | 48 |
| Wheat (yields, tons/ha) | 1.5 | 1.5 | 1.6 | 1.9 | 2.4 | 2.8 | 3.2 | 3.6 | 4 | 4.4 | 4.8 | 32 | 3 |
| Total production ('000 tons) | 53 | 55 | 61 | 81 | 108 | 134 | 163 | 194 | 228 | 264 | 302 | 1644 | 149 |
| Reduction in post harvest loss | 12 | 12 | 11 | 9 | 8 | 6 | 5 | 3 | 2 | 2 | 2 | 72 | 7 |
| Number of farmers reached | 45 | 45 | 47 | 50 | 52 | 55 | 57 | 60 | 62 | 65 | 67 | 605 | 55 |
| Employment generated (4 people /tractor/harvester/thresher) | 452 | 467 | 486 | 544 | 576 | 614 | 653 | 691 | 730 | 768 | 806 | 6787 | 617 |

Notes

- Component implementation actions will start in fiscal year 2006/07 and be implemented for 9 years to 2015. The first 5 years comprise the MKUKUTA first phase implementation schedule.
- Area under wheat production will be increased by 36% by 2010 and doubled by 2015.
- Yields per hectare will be improved by doubling current rate of 1.2 -1.5 tons per hector and tripling yields by 2015.
- At least 40% of wheat area will benefit from increased mechanisation (tractors, harvesters, threshers). As a consequence, new jobs created will average 617 per year.
- The threshing capacity for engine powered wheat thresher is 750 kg/hour.

- Post harvest crop losses will be reduced by 58% by 2010 and considerably less by 2015.
- Regional and zonal offices will encourage private businesses to purchase the tractors, harvesters and threshers through a line of credit.
- Government will facilitate expansion of area under wheat cultivation through access to suitable land in regions suitable for wheat cultivation and stepping up mechanisation.

### 4.1.5 Edible oilseeds and oil nuts

*Introduction*

Oilseeds and oil nuts such as sunflower, groundnuts, sesame, copra and soya beans are important for enhancing food security and diversifying the country's exports. The production of sunflower has increased in recent years to about 112,000 tons in 2003/04. Similarly, production of groundnuts has increased to 255, 000 tons in 2003/04, about 24% above 2000/01 production level. Simsim and other edible oils seem to fluctuate widely over time. Area under cultivation for most of the edible oils and nuts is low. The main production and yield constraints appear to be low input use, particularly for expanding area under cultivation and increasing yields per hectare. Post harvester losses are also high due to inadequate processing capacity. Lack of credit to finance major improvements in the production and marketing of these crops is also a major problem. The rationale for supporting oilseeds under MKUKUTA is to increase production and processing to satisfy domestic demand and surplus for export.

*Actions under MKUKUTA/MDGs*

Several actions are proposed under MKUKUTA/MDGs. Actions will concentrate on improving availability of inputs, oxenisation, credit facilitation and expansion of small-scale oil presses. The long-term aim is to entice private investors to establish processing plants that would process oil seeds for the domestic and export market.

Table 4.5: Oilseeds and Nuts Projections and Impact

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Av/year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oilseeds & Oilnuts ('000 Ha) | 700 | 700 | 710 | 715 | 730 | 738 | 748 | 758 | 768 | 778 | 788 | 8133 | 739 |
| Oilseeds & Oilnuts (Av. yield tons/ha) | 0.7 | 0.7 | 0.8 | 1 | 1.3 | 1.5 | 1.8 | 2 | 2.3 | 2.5 | 2.8 | 17.4 | 2 |
| Total production ('000 tons) | 490 | 490 | 568 | 715 | 949 | 1107 | 1346 | 1516 | 1766 | 1945 | 2206 | 13099 | 1191 |
| Incremental oil processed (50% of prod, '000MT) | 245 | 245 | 284 | 358 | 475 | 566 | 667 | 771 | 877 | 986 | 1097 | 6571 | 597 |
| Reduction in post harvest loss | 12 | 12 | 11 | 9 | 8 | 6 | 5 | 3 | 2 | 2 | 2 | 72 | 7 |
| Number of farmers reached | 45 | 45 | 48 | 52 | 55 | 59 | 62 | 66 | 69 | 73 | 76 | 650 | 59 |

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Av/year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Employment generated (4 people/ presser/expeller /decorticator) | 784 | 784 | 909 | 1144 | 1518 | 1811 | 2135 | 2467 | 2807 | 3155 | 3511 | 21025 | 1911 |
| Number of hours saved by women (in '000 at 1hour/20kg processed) | 12250 | 12250 | 14200 | 17875 | 23725 | 28303 | 33363 | 38549 | 43859 | 49294 | 54855 | 328523 | 29866 |

Notes

- Component implementation actions will start in fiscal year 2006/07 and be implemented for 9 years to 2015. The first 5 years comprise the MKUKUTA first phase implementation schedule.
- Area under production will be increased by 5.4% by 2010 and by 12.5% by 2015.
- Yields per hectare are expected to double by 2010 and quadruple by 2015. As a result of both area and yield improvement, production will double by 2010 and triple by 2015.
- Post harvest losses will be reduced from about 12% in 2005/06 to 5% in 2010 and to a further 2% by 2015.
- The processing capacity for expeller is 120kg/hour and for presser is 500kg/hour.
- Regional and zonal offices will encourage private businesses to purchase expellers, decorticators and oil pressers through a line of credit.
- Farmers will be encouraged to use oxenisation and tractors to expand area under cultivation through a line of credit and tractor-hire services.

### 4.1.6 Paddy

*Introduction*

Rice is the second major staple food in Tanzania. It has high domestic demand particularly in urban areas and in rice growing areas where consumption increases with income growth. Rice has incremental benefit from adoption of improved technology under irrigation yielding high returns to investment if inorganic fertilizers are used. The main constraint is the high cost of inputs. Farmers have to sell at least 80% of the crop to meet the cash cost needs of production. Paddy production is also adversely affected by weather changes (drought and floods). Poor water controls, risk of floods and flooding and need for high investment is also among the main problems of wet rice and irrigated rice systems.

*Actions under MKUKUTA/MDGs*

The proposed actions under MKUKUTA MDGs will focus on increasing investment in paddy production so as to be self-sufficient by 2015. This entails increased technical and operational support to irrigation schemes where there exists inadequate staffing and operational resources. Actions towards the development of appropriate extension packages by using irrigation and modern inputs (fertilizers and improved seeds) will lead to increased yields.

During the medium term, interventions will be targeted to the major potential irrigable areas in Coast, Lindi, Mbeya, Morogoro, Mwanza, Rukwa and Ruvuma regions. Ruvuma, Mbeya, Rukwa and Morogoro have the largest stock of unused cultivable land. Research and extension services will identify areas where fertilizer application is economically viable with irrigation development. In areas under irrigation, efforts will be made to improve farmer's access to inorganic fertilizers and hybrid seed.

Table 4.6: Paddy projections

| | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Av./Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area ('000 Ha) | 689 | 757 | 826 | 895 | 964 | 1033 | 1102 | 1170 | 1239 | 1308 | 1377 | 1446 | 12806 | 1067 |
| Yield (Tons/ha) | 1.9 | 2.1 | 2.3 | 2.5 | 2.6 | 2.8 | 3.0 | 3.2 | 3.4 | 3.6 | 3.8 | 4.0 | 35 | 2.9 |
| Total production ('000 Tons) | 1294 | 1568 | 1867 | 2193 | 2545 | 2923 | 3327 | 3757 | 4214 | 4696 | 5205 | 5740 | 39328 | 3277 |
| Quantity paddy threshed/milled (70% of production) | 906 | 1097 | 1307 | 1535 | 1781 | 2046 | 2329 | 2630 | 2950 | 3287 | 3644 | 4018 | 27530 | 2294 |
| employment generation (4 person/thresher) | 252 | 278 | 303 | 329 | 354 | 379 | 404 | 430 | 455 | 480 | 505 | 530 | 4699 | 392 |
| Number of h/holds using chemical fertilisers (%) | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 570 | 48 |
| Number of hours saved by women ('000 hours at 1hr/20kg threshed) | 10 | 12 | 13 | 15 | 17 | 18 | 20 | 21 | 23 | 24 | 26 | 27 | 227 | 19 |

Notes

- Area under paddy production increases progressively by to 60% by 2010 and doubled by 2015.
- Yields increase by over 70% by 2010 and doubled by 2015.
- Due to area and yield improvement production of paddy is doubled by 2010 and quadrupled by 2015.
- 8 man-hours used to thresh 200 kgs of paddy using manual labour. Use of machines saves an average of 19,000 hours of women labour.
- 80% of the paddy milled in 2003 and increase progressively to 95% by 2010
- 20% of households using fertilizers in 2003/04 increasing to 75% by 2015.
- The largest stock of unused cultivable is in five regions of Ruvuma (970,000 ha.), Iringa (910,000ha.), Mbeya and Rukwa (880,000 ha) and Morogoro (812,000 ha.)

## 4.2 Fruits, Vegetables Spices and Floriculture

*Introduction*

Tanzania is richly endowed with a large variety of fruits and vegetables produced in Iringa, Tanga, Arusha, Kilimanjaro, Mbeya, Dar Es Salaam, Morogoro, Coast region, Kagera, Mwanza and Dodoma regions. Only 5% of the potential area suitable for horticultural crops is exploited. Therefore the country can increase horticulture production to take advantage of prevailing domestic and export market opportunities. The main constraint relates to supply of quality planting materials due to lack of qualified

private nursery operators. Also, planting materials supplied by the current six government orchards of mother trees is inadequate to meet growing demand.

Another big problem is inadequate processing capacity. It is estimated that only 4% of the production is processed. This leads to over 40-50% wastage of fruits and vegetables – exerting severe losses to the farmers and the country. Other problems facing horticulture are: inadequate transportation, storage, processing and packaging technologies which further lead to the deterioration of these products before they reach consuming centres.

*Actions under MKUKUTA/MDGs*

The interventions in this component will focus on increasing the production of high quality fruits and vegetable products for domestic and export markets. Increased production will be complemented by increased investment in processing factories through establishment of new medium and small-scale industries and rehabilitation of existing ones.

Recruitment of skilled middle management, supervisors and workers will be a key intervention in the medium term. Actions will also focus on theoretical and practical training in export of horticulture and floriculture especially at middle management/supervisor level, skilled horticultural and floricultural workers in order to improve product quality.

Table 4.7: Horticulture Projections and Impact

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mango: Area hectares | 77224 | 84946 | 92668 | 100390 | 108112 | 115834 | 123556 | 131278 | 139000 | 146722 | 154444 |
| Yield tons/ha. | 4.35 | 4.785 | 5.22 | 5.655 | 6.09 | 6.525 | 6.96 | 7.395 | 7.83 | 8.265 | 8.7 |
| Oranges Area in ha. | 24,842 | 27326 | 29,810 | 32294 | 34,778 | 37262 | 39,746 | 42230 | 44,714 | 47198 | 49,682 |
| Average Yields | 7.52 | 8.272 | 9.024 | 9.776 | 10.528 | 11.28 | 12.032 | 12.784 | 13.536 | 14.288 | 15.04 |
| Vanilla Number of Vanila vines | 113166 | 124486 | 135806 | 147126 | 158446 | 169766 | 181086 | 192406 | 203726 | 215046 | 226366 |
| Yield gms/vanilla tree | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 | 285 | 300 |
| Number of farmers Males | 3596 | 3955.6 | 4315.2 | 4674.8 | 5034.4 | 5394 | 5753.6 | 6113.2 | 6472.8 | 6832.4 | 7192 |
| Females | 1233 | 1356.3 | 1479.6 | 1602.9 | 1726.2 | 1849.5 | 1972.8 | 2096.1 | 2219.4 | 2342.7 | 2466 |
| Reduction in % of Wastages | 50% | 45% | 40% | 35% | 30% | 25% | 20% | 15% | 10% | 10% | 10% |

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Employment Generation Export markets | 7000 | 7700 | 8400 | 9100 | 9800 | 10500 | 11200 | 11900 | 12600 | 13300 | 14000 |
| Participation of Farmers regional Markets | 3000 | 3150 | 3300 | 3450 | 3600 | 3750 | 3900 | 4050 | 4200 | 4350 | 4500 |

Assumptions:

- Percentage loss through wastages reduced from 50% in 2004 to 20% and maintained at 10% from 2012 and thereafter.
- Participation of farmers in the production of horticulture for exports within the region (exports to Kenya) increase progressively by 10%.
- Employment generation increase progressively by 10%.
- Production increase based on control of pest and diseases – case of fruit flies.

CASH-CROPS

## 4.3 Coffee

*Introduction*

Both Robusta and Arabica coffee are produced in Tanzania. Arabica coffee accounts for about 75% of the total production. Main Arabica producing areas are: Kilimanjaro, Arusha, Mbeya, Ruvuma, Ukerewe, Mara and Kigoma. Robusta coffee is largely grown in Kagera region and small quantities in Tanga and Morogoro. About 27,000 small holders produce coffee in small plots averaging 0.5 hectares.

There are several reasons for undertaking interventions in the coffee section. First, production is on a downward trend. Production has fallen from a peak of nearly 67,000 ton in 1980/81 to only 33,000 tons in 2004 – a fall of 50%. Likewise, yields per hectare are low, averaging 151 kilograms for Arabica and 260 kilograms for Robusta. These problems are partly caused by insufficient control of pests and diseases, especially antestia, leaf rust and coffee berry disease. Other problems relate to aging of trees, unattractive producer prices and high overhead costs of marketing.

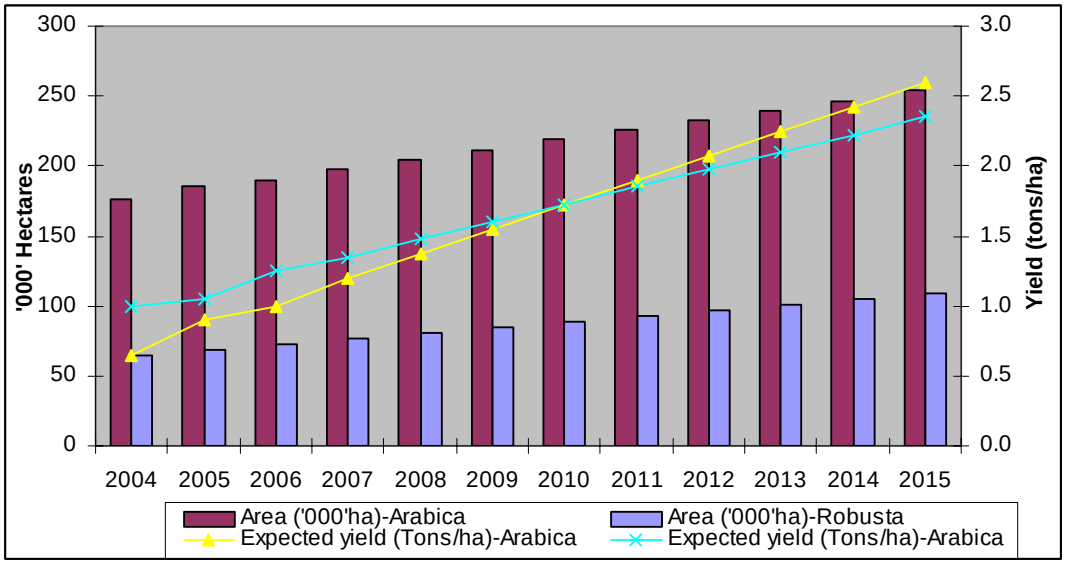
*Actions under MKUKUTA/MDGs*

Several actions are proposed to reverse declining production of coffee. In the short term yields could be improved by increasing the capacity of farmers to control pests and diseases, improve initial processing capacity and apply improved husbandry practices. In the medium and longer term, new improved coffee trees have to be planted to replace the aging stock.

Table 4.8: Coffee Projections and impact

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Av./ year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area ('000'ha)-Arabica | 176 | 185 | 190 | 198 | 205 | 212 | 219 | 226 | 233 | 240 | 247 | 2328 | 212 |
| Area ('000'ha)-Robusta | 65 | 69 | 73 | 77 | 81 | 85 | 89 | 93 | 97 | 101 | 105 | 935 | 85 |
| Total area under coffee | 241 | 254 | 263 | 275 | 286 | 297 | 308 | 319 | 330 | 341 | 352 | 3263 | 297 |
| Yield (tons/ha) - Arabica | 0.7 | 0.8 | 0.9 | 1.2 | 1.3 | 1.4 | 1.6 | 1.8 | 1.9 | 2.1 | 2.3 | 16 | 1.4 |
| Yield (tons/ha) - Robusta | 1.0 | 1.1 | 1.3 | 1.4 | 1.6 | 1.7 | 1.9 | 2.0 | 2.2 | 2.3 | 2.5 | 19 | 1.7 |
| Total production - Arabica | 114 | 139 | 171 | 227 | 261 | 305 | 351 | 399 | 450 | 503 | 559 | 3480 | 316 |
| Total production - Robusta | 65 | 76 | 95 | 110 | 128 | 147 | 168 | 189 | 212 | 236 | 261 | 1687 | 153 |
| New coffee seedlings (Arabica) | 43624 | 45500 | 65800 | 75200 | 84600 | 94000 | 103400 | 72272 | 62298 | 52324 | 42350 | 741368 | 67397 |
| New coffee seedlings (Robusta) | 13975 | 14835 | 15695 | 16555 | 17415 | 18275 | 19135 | 15,500 | 12300 | 9,100 | 5900 | 158685 | 14426 |
| Total | 57599 | 60335 | 81495 | 91755 | 102015 | 112275 | 122535 | 87772 | 74598 | 61424 | 48250 | 900053 | 81823 |
| Improved coffee hullers | 150 | 185 | 210 | 180 | 140 | 107 | 100 | 80 | 69 | 56 | 42 | 1318 | 120 |
| Number of farmers reached (%) | 35 | 36 | 40 | 45 | 49 | 54 | 58 | 63 | 67 | 72 | 76 | 596 | 54 |
| Expected improvement in farm incomes (% increase over 2004 period) | 100 | 5 | 6 | 8 | 9 | 11 | 12 | 14 | 15 | 17 | 18 | 216 | 20 |

Figure 4.1: Coffee yields are expected to reach 2.4 - 2.5 tons per hectare by 2015




Notes:

- Component implementation actions will start in fiscal year 2005/06 and be implemented for 10 years to 2015. The first 5 years comprise the MKUKUTA first phase implementation schedule.
- Area under new coffee seedlings is expected to triple by 2010 for Arabica coffee and increase by about 40% for Robusta coffee.
- Yields per hectare are expected to double for both Arabica and Robusta coffee.
- As a result of improved yields and area expansion, production of coffee is expected to double by 2010 and tripled by 2015.
- The improved initial coffee processing, including better care during drying of the coffee beans is expected to raise quality by 20%.
- Farm incomes are expected to increase by between 12-20% by 2015.
- New coffee seedlings are expected to mature between 36-48 months after planting and produce 7-9 months after flowering.
- New coffee seedlings shall be planted according to the following specifications: Arabica coffee (2.7m x 2.7m), Robusta (3.3m x 3.3). Correct spacing is important for improving yields.

## 4.4 Tobacco

*Introduction and Rationale*

Tobacco is one of the major agricultural export crops, being the third largest foreign exchange earner after coffee and cashew nuts (BOT, 2003). It is the main source of income to some 72,000 smallholder farmers who are striving to get or stay out of poverty. It also offers employment opportunities in both tobacco farms and in the processing factories. In addition, the crop provides raw material for cigarette manufacturing factories, thus offering further employment opportunities in the country. Thus the rationale behind supporting this crop under MKUKUTA is to increase incomes and employment opportunities.

Production is mainly by small-scale growers, with a few large-scale growers found in Iringa Region. The problem of input supply is critical since tobacco is a very input intensive crop. Major inputs include seeds, fertilizers and chemicals for the nurseries. Because tobacco buyers have scaled down the provision of inputs, most farmers have no choice except to produce at average management levels, which yields 0.5 Tones per hectare. Tobacco would become significantly more profitable with potential management, which would yield 2.5 Tones per hectare. Apart from a relatively large input requirement, tobacco also demands considerable investment of family labour. This is a major reason why most farmers only cultivate about one acre of tobacco at a time at each management level. This is also a serious constraint to uptake of potential management practices. Technological advancement still makes good sense, even when it is necessary to use hired labour.

*Proposed Actions*

The aim will be to intensify production through increased yields from an average of 1 tonne per hectare to its potential yield of 2.5 tonnes per hectare 2015 (equivalent to 150% increase in productivity over the next 10 years), and to expand production through increased acreage by 30 percent by the year 2015. The key intervention is the increase in fertilizer usage from average to recommended rates and to plant more seeds.

Table 4.9: Tobacco Projections

| | 2004/5 | 2005/6 | 2006/7 | 2007/8 | 2008/9 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Area Under Cultivation (Ha) | 47917 | 49354 | 50313 | 51750 | 53667 | 54769 | 56159 | 57548 | 58938 | 60327 | 61717 |
| Yields (Tons/Ha) | 1 | 1.12 | 1.28 | 1.47 | 1.61 | 1.77 | 1.92 | 2.08 | 2.24 | 2.40 | 2.55 |
| Total Production ('000'Tons) | 47.92 | 55.28 | 64.40 | 76.07 | 86.40 | 96.78 | 108.05 | 119.76 | 131.90 | 144.48 | 157.50 |

1. Area cultivated in 2004/05 was computed from the production figures and yields.
2. Production for 2004/5 was taken as the average for 2001-2004 (= 47917 tonnes)

Impacts

- Increased incomes of farmers;
- Employment generation in processing factories;
- Increased raw material for cigarette manufacturing;
- Increased export earnings.

Assumptions

- Implementation actions will start fiscal year 2005/2006;
- There will be a gradual increase in input (fertilizers and seeds) use to recommended rates;
- There will be an improvement in both quality and quantity of extension services provided;
- There will be a gradual improvement in the marketing system of tobacco.

## 4.5 Cashew nuts

*Introduction and Rationale*

Cashews are an important export for Tanzania and an important source of income for small farmers in the southern coastal region. However, the industry is not likely to expand further, or even to maintain current production levels, unless constraints are addressed. These include defining a more constructive role for the Cashew Board, reversing the decline in export crop quality, assisting farmers with the financing of input costs, and reducing high taxes on exports. Beyond correcting these immediate problems, there is an opportunity for the industry to expand in several directions. Replanting with improved varieties would reduce costs and make Tanzania a more competitive exporter. Developing a competitive private sector processing industry would create jobs and reduce dependence on India as the market for raw nuts.

Cashew offers farmers an excellent opportunity for high financial returns. Improved cashew nut production is based on the use of sulphur dust, while potential production includes both extra dust and a small amount of pesticide. The improved level is especially attractive (with costs amounting to only 40% of the net crop income), showing that an investment in sulphur dust can be of major benefit to farm income. Because this requires fairly large cash expenditure, however, input programs are obviously important. Nevertheless, about half of the costs of produce at the improved level are accounted for by hiring a blower to apply the dust. Therefore, programs focused on increasing the availability of this equipment could also be very rewarding. Potential production, on the other hand, does not appear to make good financial sense and provides less income than improved management.

*Proposed Actions*

To intensify production through increased yields from the current average of 0.5 tonnes per hectare to improved level yields of 0.96 tonne per hectare by the year 2015 (equivalent to 90 % increase in productivity over the next 10 years), and to expand production through increased acreage by 30 percent by the year 2015. The key interventions are the increase in Sulphur Dust application, and replanting trees with improved varieties.

Table 4.10: Cashew nuts Projections

| | 2004/5 | 2005/6 | 2006/7 | 2007/8 | 2008/9 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Area Under Cultivation ('000'Ha) | 190 | 193.8 | 197.6 | 205.2 | 214 | 217.94 | 223.88 | 229.82 | 235.76 | 241.7 | 247.64 |
| Yields (Tons/Ha) | 0.5 | 0.53 | 0.58 | 0.65 | 0.6875 | 0.74 | 0.79 | 0.84 | 0.8875 | 0.94 | 0.99 |
| Total Production ('000'Tons) | 95 | 101.75 | 113.62 | 133.38 | 147.13 | 160.73 | 176.31 | 192.47 | 209.24 | 226.59 | 244.54 |

1. Area cultivated in 2004/05 was computed from the production figures and yields
2. Production for 2005 was taken as the average for 2003/04-2004/05 (= 95,000 tonnes)

Impacts

- Increased incomes of farmers;
- Employment generation in cashew processing factories;
- Increased export earnings.

Assumptions

- Implementation actions will start fiscal year 2005/2006;
- There will be a gradual increase in Sulphur Dust application;
- There will be an improvement in both quality and quantity of extension services provided;
- There will be a gradual improvement in the marketing system of cashew nuts;
- There will be a gradual increase in access to Sulphur blower by farmers.

## 4.6 Cotton

*Introduction and Rationale*

Cotton is another major export crop in Tanzania. It contributes a lot in terms of export earnings and provides employment to about half a million rural households. Primarily it is the smallholder farmers who produce Cotton. They do so on farms of about 0.5 to 10 hectares (the average is 1.5 hectares). It is however clear that the cotton sector suffers from many problems. Most cotton growers do not use fertilizer or other chemicals, mechanized (or even animal) power, or irrigation. Also, most of the seed currently used has been re-cycled for more than 20 years. This results into extremely poor yields. These outdated seeds also provide a very low ginning outturn (GOT) of only about 33% lint. Because lint is the most valuable product of cotton, (the other being seed), this low GOT prevents more attractive prices from being offered to farmers. The limited capacity of farmers to purchase pesticides and other essential inputs is another major constraint to improve sector performance.

In terms of profitability, cotton becomes significantly more profitable at each successive management level. With average management, farmers do not use pesticides. Improved management is based on two chemical applications, and potential management is based on the recommended six applications. In order for farmers to produce at the most profitable management level, a solution to the problem of access o inputs must be found.

*Proposed Actions*

The aim will be to intensify production through increased yields from an average of 1.5 tonnes per hectare to its potential yield of 4 tonnes per hectare by 2015 (equivalent to 166% increase in productivity over the next 10 years), and to expand production through increased acreage by 30 percent by the year 2015. The key interventions are the increase in fertilizer and chemical application to reach recommended rates, the use of quality seed, and mechanization.

Table 4.11: Cotton Projections

| | 2004/5 | 2005/6 | 2006/7 | 2007/8 | 2008/9 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Area Under Cultivation ('000'Ha) | 178 | 182.00 | 187.00 | 192.00 | 199.00 | 205.00 | 209.60 | 215.06 | 220.51 | 225.97 | 231.43 |
| Yields (Tons/Ha) | 1.5 | 1.60 | 1.65 | 1.80 | 2.10 | 2.70 | 3.15 | 3.16 | 3.43 | 3.70 | 3.97 |
| Total Production ('000'Tons) | 267.18 | 291.20 | 308.55 | 345.60 | 417.90 | 553.50 | 660.24 | 678.97 | 756.05 | 836.09 | 919.10 |

1. Area cultivated in 2004/05 was computed from the production figures and yields
2. Production for 2004/5 was taken as the average for 2002/03-2003/04 (= 267180 tonnes)

Impacts

- Increased incomes of farmers;
- Employment generation in ginneries;
- Increased export earnings.

Assumptions

- Implementation actions will start fiscal year 2005/2006;
- There will be a gradual increase in fertilizer and chemical application to reach recommended rates, the use of quality seed, and mechanization;
- There will be an improvement in both quality and quantity of extension services provided;
- There will be a gradual improvement in the marketing system of cotton.

## 4.7 Sugar Cane

*Introduction*

Sugar cane is an important food and commercial crop whose production requires adequate moisture and temperature that are essential for efficient growth and productivity. Sugar cane is produced by private companies and out growers. Out grower schemes are increasing in the traditional sugar growing areas leading to increased sugar production for the past five years. Sugar cane out growers lack investment and operating capital as well as basic equipment and machinery.

The sugar cane industry is faced with low level of production which is attributed to poor cane varieties/research, low level of skills/extension services, low input use, inadequate access to credit and limited land for cane expansion. This has led to low capacity utilization of sugar mills.

*Actions under MKUKUTA/MDGs*

The actions in this component will focus on increasing sugar production by expanding sugar cane farms in order to meet domestic demand and generate surplus for export. This will increase the domestic requirement from 340,000 metric tones per year to 497,500 metric tons by 2010.

Table 4.12: Sugar Cane Projections

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Av/year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area Out grower | 8850 | 9735 | 10620 | 11505 | 12390 | 13275 | 14160 | 15045 | 15930 | 16815 | 17700 | 18585 | 19470 |
| Estate (company) | 16,900 | 18590 | 20,280 | 21970 | 23,660 | 25350 | 27,040 | 28730 | 30,420 | 32110 | 33,800 | 35490 | 37,180 |
| Yield Out grower | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 |
| Estate | 71 | 78 | 85 | 92 | 99 | 106 | 113 | 120 | 127 | 134 | 141 | 148 | 155 |
| Number of Out growers | 6,000 | 6600 | 7,200 | 7800 | 8,400 | 9000 | 9,600 | 10200 | 10,800 | 11400 | 12,000 | 12600 | 13,200 |
| Number of beneficiaries | 150,000 | 165000 | 180,000 | 195000 | 210,000 | 225000 | 240,000 | 255000 | 270,000 | 285000 | 300,000 | 315000 | 330,000 |
| Area | | 26204 | 28824 | 31444 | 34064 | 36684 | 39304 | 41924 | 44544 | 47164 | 49784 | 52404 | 55024 |
| Average yields Tons Sugar Cane/Ha. | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 | 210 |
| Current Yields | | 71 | 78 | 85 | 92 | 99 | 106 | 113 | 120 | 127 | 134 | 141 | 148 |
| TSP – 65 kgs/ha. | 982605 | 9,8260 | 196521 | 2,941,781 | 470210 | 4,7021 | 94042 | 141063 | 333,905 | 33,390 | 66,781 | | 100,171 |

In the medium term, improved cane varieties will be imported while intensifying breeding programmes at the Sugar Research Institute at Kibaha and improve farmer's access to credit and farm inputs. The sugar extension services will be strengthened while the current marketing and handling structure in the sugar industry will be reformed in order to increase efficiency and reduce storage overheads paid by consumers in order to increase per capita consumption.

1. Area and yield increase progressively by 10% leading to an increase of 70% by 2010
2. 100 TCD capable of producing 1,000 – 2000 tons of sugar per annum
3. Village plants capable of crushing 2.5 tons of cane per hour and produce between 100 – 600 kg sugar per day
4. H/H processing plants (women groups) increase by 30%
5. Employment generation increase progressively by 10%

## 4.8 Livestock Production

*Introduction and rationale*

The livestock sector has maintained a steady annual growth rate of over 2.7 percent during the last decade. This is lower than the rate of human population growth of 2.9 percent. According to National Strategy for Growth and Reduction of Poverty (NSGRP) of 2004 the livestock sector is expected to grow at 9% by 2010. However, given the importance of agriculture as the mainstay of rural livelihoods, livestock must grow much faster if rural poverty reduction is to become a reality in Tanzania. The contribution of the livestock industry to both Agricultural and National Gross Domestic Product (GDP) is 13% and 6.1%, respectively. About 40% of the livestock GDP originates from beef production, 30% from dairy products and about 30% from poultry and small stock production.

The per capita consumption of livestock products is also low estimated at 10 kg of meat and 39 litres of milk. The rationale for supporting livestock industry is due to the fact that the industry continues to support the majority of rural Tanzanians through provision of animal protein, manure for the crop fields, employment opportunities, draught power and energy (biogas). Support to livestock industry will contribute to the attainment of MDG Goal for eradicating hunger.

### 4.8.1 Cattle Production (Dairy and Beef)

Currently, cattle production (Dairy and Beef) in the country is constrained by lack of selection and the use of productive parents, poor infrastructure, prevalence of animal diseases, inefficient marketing system, low consumption, inadequate nutrition, weak livestock farmers' organizations, inadequate financial and credit facilities, insufficient extension and research services., poorly organized marketing system, and inadequate processing facilities. The task ahead is to establish an environment where opportunities for higher incomes and employment are created for resource-poor livestock farmers including the commercial farming sector. The strategy under MKUKUTA is to encourage the development of commercially oriented livestock industry through Private sector participation in processing, marketing and export of livestock and livestock products. The action under this component is to improve capacity of private sector to carry out needed investment through own cash and/or using credit arrangement. The role of government will be among others to ensure effective delivery of extension and research services and support private sector through livestock infrastructure development for effective marketing and disease control, improved access to water and livestock productive inputs. The government will encourage cost sharing for the provision of services such as charcoal dams and dip construction.

Specific objectives

- To increase production levels of livestock products.
- To promote processing, marketing and consumption of quality beef and dairy products to satisfy domestic and export market.
- To increase farmer's income

### 4.8.2 Sheep and Goats

Sheep and goats farming that is practiced by about 30% of the agricultural households in Tanzania Mainland is constrained by poor nutrition, animal diseases, low genetic potential and poor marketing infrastructure. Several actions are proposed under MKUKUTA. These include upgrading and

commercialisation of sheep and goats to improve their productivity and profitability. Specific actions will be to support exotic bucks/Rams to livestock groups through credit arrangement and provision of advisory and research services.

Specific objectives

- To increase productivity of sheep and goat through upgrading of indigenous breed.
- To raise farmer's income.

### 4.8.3 Poultry

In Tanzania the traditional poultry system is the largest, supplying 100% of poultry meat and eggs consumed in rural and 20% in urban areas. The rationale for supporting poultry production is that the majority of rural poor depend on poultry as an alternative source of income. Disease is a major constraint on the expansion of the commercial poultry sector, especially for smaller-scale producers.

The strategy proposed under MKUKUTA focus to improve capacity of farmers and other private dealers to improve the production levels of the local chicken. Action proposed under this component will be upgrading of local chicken under traditional system and ensure improved husbandry practices through technical support services and diseases control measures.

### 4.8.4 Other Major Interventions under MKUKUTA/MDGs

| Operational Target 2: Increased growth rate for livestock sub sector from 2.7% in 2000/01 to 9% by 2010 | |
|---|---|
| Category | Intervention |
| Range Development and Management (Land, Water and Pasture) | - Develop integrated rangeland management and utilization plans<br>- Allocate and demarcate land for permanent grazing land for pastoral and agro pastoralists.<br>- Institutionalise a system for early warning system (drought, floods)<br>- Develop and implement sensitisation and educational programmes on the Land Act No. 4 of 1999 and the Village Act No. 5 of 1999.<br>- Control tsetse flies and ticks<br>- Promote public-private partnership in establishment of livestock routes to watering points, construction and maintenance of dams/charcos<br>- Rehabilitate and purchase heavy duty equipment for constructing water points<br>- Promote and support establishment of water users committees and associations<br>- Increase use of supplementary feeds<br>- Strengthen Pasture Seed Farms in order to increase production of quality pasture, forages and hay |
| Animal Health | - Develop and execute disease control program for scheduled diseases and zoonoses<br>- Promote and support private sector in delivery of livestock services<br>- Strengthen diagnostic and inspectorate/sanitary services<br>- Review laws/acts and regulations to comply with the current situation<br>- Prepare and implement livestock disease control strategies and emergency preparedness plans<br>- Establish Disease Free Areas in strategic areas for export purposes<br>- Develop/ rehabilitate infrastructure for the control of livestock diseases (dips, LDCs, VICs)<br>- Establish National Livestock Development Fund<br>- Strengthen Tanzania Veterinary Council |

| Operational Target 2: Increased growth rate for livestock sub sector from 2.7% in 2000/01 to 9% by 2010 | |
|---|---|
| Category | Intervention |
| Livestock Research | - Develop and introduce new and appropriate technology<br>- Strengthen Marketing research<br>- Rehabilitate and Retool Livestock Research Institutions and Laboratories<br>- Establish Biotechnology laboratories<br>- Promote livestock production systems (Beef, Dairy, Small Stock, Poultry)<br>- Adopt and implement the Livestock Breeding Policy<br>- Improve livestock breeds and production capacity<br>- Promote and support establishment of Breeders Associations |
| Livestock Processing and Marketing | - Construct /rehabilitate livestock marketing infrastructure (modern abattoirs, holding grounds, watering points, livestock markets)<br>- Establish/Rehabilitate milk collection centres<br>- Review and enforce laws and rules of quality standards<br>- Establish and strengthen laboratories for quality assurance of livestock products<br>- Establish and support Dairy and Meat Stakeholders' Boards<br>- Strengthen Marketing Information<br>- Improve quality of livestock inputs, products and services<br>- Promote and support establishment of processing industries/agro processing<br>- Capacity building (experts and stakeholders) in the field of processing of livestock products<br>- Promote research on the better use of livestock by-products |
| Livestock Extension | - Recruit Community Livestock Extension Workers<br>- Strengthen extension services (Capacity building)<br>- Facilitate formation of Livestock Keepers Associations<br>- Promote and support establishment of Livestock Farm Field Schools<br>- Promote Information Communication Technology (ICT)<br>- Develop and disseminate quality extension packages<br>- Develop performance standards and framework for monitoring and evaluation of extension services |
| Livestock Training | - Develop appropriate curricular<br>- Human resource development (technical staff and farmers)<br>- Rehabilitate and retooling Livestock Training Institutes |
| Livestock Inputs | - Strengthen the importation, distribution systems and the use of livestock inputs<br>- Rehabilitate and retooling LMUs, Pasture Seed Farms and NAIC<br>- Promote production and distribution of heifers, dairy goats, pasture seeds and fodder planting materials<br>- Promote use of draught animal power for farm and domestic operations.<br>- Identify and regulate importers, distributors and stockists and establish local demand for livestock inputs<br>- Monitoring and evaluation to ensure livestock keepers have access to livestock inputs ( e.g. veterinary drugs, heifers ) |
| Livestock Information | - Establish database system to collect, process and disseminating livestock information to different users<br>- Capacity development |

Table 4.13: Livestock Projections

| Dairy | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | 2015/16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Improved Dairy Cattle | 500,000 | 510,000 | 520,200 | 530,604 | 541,216 | 552,040 | 563,081 | 574,343 | 585,830 | 597,546 | 609,497 |
| Increase in Milk production ('000 Litres) | 1,180,000 | 1,221,300 | 1,264,046 | 1,308,287 | 1,354,077 | 1,401,470 | 1,450,521 | 1,501,290 | 1,553,835 | 1,608,219 | 1,664,507 |
| Reduced mortality rate | | | | | | | | | | | |
| Increased Milk intake per person | 39 | 41 | 43 | 45 | 47 | 50 | 52 | 55 | 58 | 61 | 64 |
| Employment generation (20 people per milk/animal feed plant) | 500 | 510 | 520 | 531 | 541 | 552 | 563 | 574 | 586 | 598 | 609 |
| Beef | | | | | | | | | | | |
| Increase in Beef production (tons) | 184,000 | 187,680 | 191,434 | 195,262 | 199,168 | 203,151 | 207,214 | 211,358 | 215,585 | 219,897 | 224,295 |
| Reduced mortality rate | | | | | | | | | | | |
| Increased meat consumption per person | 10 | 11 | 11 | 12 | 12 | 13 | 13 | 14 | 15 | 16 | 16 |
| Employment generation (15 people per milk/animal feed plant) | 400 | 420 | 441 | 463 | 486 | 511 | 536 | 563 | 591 | 621 | 652 |
| Shoats | | | | | | | | | | | |
| Increased Lamb/Mutton production (Tones) | 75,800 | 78,453 | 81,199 | 84,041 | 86,982 | 90,027 | 93,178 | 96,439 | 99,814 | 103,308 | 106,923 |
| | | | | | | | | | | | |
| Poultry | | | | | | | | | | | |
| Eggs | | | | | | | | | | | |
| Increase in eggs production('000) | 910,000 | 937,300 | 965,419 | 994,382 | 1,024,213 | 1,054,939 | 1,086,588 | 1,119,185 | 1,152,761 | 1,187,344 | 1,222,964 |
| Increased eggs intake per person | 19 | 20 | 20 | 21 | 21 | 22 | 23 | 23 | 24 | 25 | 26 |
| Meat | | | | | | | | | | | |
| Increase in Poultry Meat production | 63,000 | 65,520 | 68,141 | 70,866 | 73,701 | 76,649 | 79,715 | 82,904 | 86,220 | 89,669 | 93,255 |
| | | | | | | | | | | | |

Assumptions

- Component implementation will start in year 2005/2006 and implementation will be implemented for 10 years (2004-20025) the first 5 years will be the first phase for MKUKUTA
- Beef Cattle will increase by an average of 20% for the first five years of MKUKUTA implementation through use of disease control measures and improved pasture. .
- Milk will increase from the current to 30%. This will result from use of disease control measures, improved pasture and improved cattle breeding by use of stud bulls and AI.
- Private individuals/farmers will be encouraged to participate in meat, milk processing, establishment of pasture farms and animal feed processing through credit lines
- Rehabilitation of dips and construction of charcoal dams will be on cost sharing basis
- Dairy goats will increase from the current level to 30% for the period of implementing MKUKUTA through disease control measures, i pasture, use of improved feeds and extension services
- Sheep and goats meat will increase by an average of 30% for the whole period of implementation due to increased use of use of disease control measures, improved feeds and very prolific does and ewes
- Private individuals/farmers will be encouraged to participate in meat, milk processing and animal feed processing through credit lines
- Eggs will increase by average of 30% in the whole period of MKUKUTA Implementation. This will result from use of disease control measures, improved feeds and improved husbandry
- Private individuals/farmers will be encouraged to participate in meat processing, establishment of hatchery farms and poultry feed processing through credit lines

## 4.9 Agricultural Extension Services

*Introduction and rationale*

Agricultural extension is an important component for improving agricultural productivity and raising farm incomes. The provision of extension services has changed from the *technology transfer model* to the present *participatory problem solving approaches*, which aim at empowering farmers and their families. This view is based on adult education models that recognises the need for greater interaction and participatory dialogue and acknowledges the farmers' expertise in identifying problems and selecting options for improvement. MKUKUTA costing interventions aims at facilitating this extension view. In addition, the MKUKUTA costing aims at reducing several constraints in the extension service. These include: inadequate linkage between research and extension, inadequate extension packages, lack of adequate housing and transport for extension personnel, and inadequate training of extension staff.

Specific objectives

- To increase yields and subsequent production of crops and livestock,
- To facilitate attainment of a range of other services, including marketing, environmental conservation, gender balance, poverty reduction and other off-farm activities, and
- To increase farmer's income.

Table 4.14: Specifications and projections

| Intervention | Measure | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High skilled staff | Units | 450 | 560 | 600 | 687 | 762 | 837 | 912 | 987 | 1062 | 1137 | 1212 |
| Training - staff | Man-days | 12000 | 12500 | 13000 | 13500 | 14000 | 14500 | 15000 | 15500 | 16000 | 16500 | 17000 |
| Training - farmers | Man-days | 25000 | 26500 | 28000 | 29500 | 31000 | 32500 | 34000 | 35500 | 37000 | 38500 | 40000 |
| Transport – motor-cycles | Units (50% of high and middle extension staff) | 6000 | 6250 | 6500 | 6750 | 7000 | 7250 | 7500 | 7750 | 8000 | 8250 | 8500 |
| Transport – bicycles | Units (70% of lower cadre staff) | 15000 | 15500 | 16000 | 16500 | 17000 | 17500 | 18000 | 18500 | 19000 | 19500 | 20000 |
| Housing | Units (50% of high and middle extension staff) | 6000 | 6250 | 6500 | 6750 | 7000 | 7250 | 7500 | 7750 | 8000 | 8250 | 8500 |

Assumptions

- Component implementation actions will start in fiscal year 2005/06 and be implemented for 20 years to 2025. The first 5 years comprise the MKUKUTA first phase implementation schedule. The next years up to 2015 comprise MDGs and 2025 Development Vision.
- Employment of skilled extension staff will be stepped up and doubled by 2010 and tripled by 2015.
- The proposed extension staff incentive package is also meant to defray costs of maintaining the motorcycles and entices better quality work.
- Housing component is expected to stabilise the extensionist working environment and become more prepared to work in rural areas where their clients are situated.
- The National extension fund will be used to defray some of the costs of stepping up the extension service, including farmer training.
- Resources will be used to facilitate better targeting and better information delivery.
- Local Government Authorities capacity to implement credible extension services will be improved.
- There will be adequate political and leadership will, particularly at the grass roots level to implement the extension plans and strategies.

## 4.10 Agricultural Research

*Introduction and rationale*

The purpose of agricultural research is to ensure that demand-driven knowledge, information and technologies are provided by the National Agricultural Research Systems (NARS). In particular, such research should be able to promote sustainable food security, income generation, and employment growth and export enhancement. The MKUKUTA-based costing will endeavour to remove several constraints facing research services. These include: inadequate and professionally qualified researchers, inadequate funding of research activities, obsolete research facilities, inadequate transport and weak documentation and dissemination of research findings and information.

*Specific objectives*

- To increase yields and subsequent production of crops and livestock,
- To facilitate attainment of a range of other services, including environmentally friendly technological packages, and
- To increase farmer's income.

Table 4.15: Specifications and projections

| Intervention | Measure | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High skilled staff | Units | 120 | 125 | 128 | 132 | 136 | 140 | 144 | 148 | 152 | 156 | 160 | 164 |
| Training - staff | Man-days | 2000 | 2150 | 2250 | 2383 | 2508 | 2633 | 2758 | 2883 | 3008 | 3133 | 3258 | 3383 |
| Transport – motor-cycles | Units (50% of high and middle research staff) | 60 | 63 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | 82 |
| Transport – bicycles | Units (70% of lower cadre staff) | 150 | 160 | 165 | 173 | 181 | 188 | 196 | 203 | 211 | 218 | 226 | 233 |

Assumptions

- Component implementation actions will start in fiscal year 2005/06 and be implemented for 10 years to 2015. The first 5 years comprise the MKUKUTA first phase implementation schedule. The next years up to 2015 comprise MDGs.
- Resources will be used for research that meets farmer identified needs and technologies that are cost effective.
- Research fund to help in developing new technologies and disseminate research findings to farmers.
- Strong public-private partnership in research activities, including collaboration with other research institutions.
- Research will be institutionalised through the Client-Oriented Research and Development Management Approach (CORDEMA)

## 4.11 Irrigation

*Introduction and rationale*

Tanzania is well endowed with water, both on the surface and below ground water, but suffers nevertheless from water shortages due to insufficient capacity to store and access it. Cumulatively, the lakes, wetlands and aquifers provide huge natural storage capacity. The country also has 2.7 million hectares of wetlands (Usangu, Malagarasi). The total renewable water resource in Tanzania is estimated to be around 80 cubic km/year, of which 30 cubic km/year is ground water (FAO, 2004). Several hydrological studies indicate potential locations where water tables are shallow and water yield is quite significant (Hydrological Map of Tanzania, 1990). Some of high ground water potential areas identified include:

- Makutupora in Dodoma region and Ruvu basin in coast region
- Sanya-Hale plain in the Pangani basin
- Arusha and the Karoo Sandstone in Tanga region
- Fault zones around Kilimanjaro
- Parts of Morogoro, Iringa, and Mbeya, Mtwara, and Lindi

The recent JICA/GOT Irrigation Master Plan confirms that abundant groundwater is available in several regions of the country; e.g., volcanic areas of northern and southern Tanzania as well as the sedimentary coastal basins.

Tanzania's ample water is matched by ample land suitable for irrigation. Of the total 44 million hectares suitable for agricultural production in Tanzania, only 10 million ha is under cultivation that is equivalent to 24.5 percent of the total arable land and out of this only 249,992 ha is irrigated. Tanzania's irrigation potential is about 29.4 million ha of which 2.3 million ha are of high development potential, 4.8 million ha fall under medium potential and 22.3 million ha are of low irrigation potential. This represents mere 2 percent of total cultivated area in the country. Approximately three quarters of the presently irrigated area is farmed by smallholders in about six hundred small-scale irrigation schemes, usually using diversions and/or furrows in one of the nine major river basins. Very little irrigation is at present based on abstraction of ground water, and this provides a promising area for future development with direct and affordable benefits to the poor. Rice is by far the most important crop irrigated in Tanzania, but sugarcane is also irrigated.

Irrigation at present is constrained by affordability of the investments required and by profitability of their use. Equipment, even the relatively modest implements needed for localized access to ground water, are more expensive in Tanzania than in, for example, India, by a factor of about three (FAO, 1997). Researchers from UK's Cranfield University found that "In Africa the cost of a borehole drilled by a truck-mounted rig can be extremely high costing as much as 10–20 times the cost of the drilling and pump in Asia. High unit costs mean that too few wells are drilled and communities and farmers remain dependent on international aid programs for this form of infrastructure development" (Carter 1999). And to compound the adverse impact of high initial costs, producers face difficulties accessing high yielding varieties and moving products to market. Irrigation and agricultural productivity are clearly intimately linked, and neither can advance substantially independently from the other.

A suitably designed ground water irrigation system could reduce reliance on large bodies of water, including rivers and lakes, and promote more sustainable use of locally sourced and managed irrigation systems. Since the surface water available varies with rainfall, open wells and borehole or tube-wells can be constructed to spread the availability of water throughout the growing season. Compared to large surface irrigation schemes the design of which is driven by topography and hydraulics, ground water development is often much more amenable to poverty targeting and is generally less capital intensive.

Ground water irrigation can complement that based on surface water. Integrating ground water abstraction with rain water harvesting and watershed management, along with efficient water distribution systems, will lead to reliable, cost-effective irrigation systems.

The MKUKUTA strategies envision support for suitably designed ground water irrigation system (open wells, borehole tube-wells, rainwater harvesting) that will reduce reliance on large bodies of water, including rivers and lakes. The aim will be to promote more sustainable use of locally sourced and managed irrigation systems. Since the surface water available varies with rainfall, open wells and borehole or tube-wells can be constructed to spread the availability of water throughout the growing season. Compared to large surface irrigation schemes the design of which is driven by topography and hydraulics, ground water development is often much more amenable to poverty targeting and is generally less capital intensive. Therefore support will be given to ground water irrigation to complement that based on surface water. Integrating ground water abstraction with rain water harvesting and watershed management, along with efficient water distribution systems, will be expected to lead to reliable, cost-effective irrigation systems.

Further, Tanzania's Agriculture Sector Development Programme (ASDP) acknowledges the importance of an appropriate institutional and incentive framework for the sustainable development of smallholder irrigation. Support under MKUKUTA/MDGs will be provided to improve this framework.

Table 4.16: Institutional Framework for Sustainable Development of Smallholder Irrigation Systems

| Required Conditions | Targets |
|---|---|
| Technical Self-reliance | • Capacity of Irrigation staff, LGA Staff and Extension Workers<br>• Farmers knowledgeable about water management and O & M<br>• Appropriate choice of technology<br>• Attention to environmental issues |
| Financial Self-reliance | • Rationalization of the tax regime that small farmers face<br>• Better access to financial services, especially savings<br>• Active private firms in supplying equipment and implements |
| Institutional and organizational support | • Clarity on roles and responsibility of public servants at district and national levels<br>• Strengthening/reform of Irrigation Section, ZIUs and LGAs<br>• Legal attention to land tenure, water rights, ownership and responsibility of irrigation infrastructure<br>• Improved access to advisory services<br>• Capacity to collect water fees and pay O & M cost<br>• Investment climate to support growing constellation of small firms manufacturing equipment and providing services |

Source: ASDP Working Group 2 Report on Irrigation development in Tanzania

*Specific objectives*

- To increase yields and subsequent production of irrigated crops, and
- To increase farmer's income

Table 4.17: Specifications and projections

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High skilled experts | 350 | 380 | 410 | 440 | 470 | 500 | 530 | 560 | 590 | 620 | 650 | 680 |
| Staff training (mandays) | 6500 | 6700 | 6850 | 7033 | 7208 | 7383 | 7558 | 7733 | 7908 | 8083 | 8258 | 8433 |
| Open wells (units: 1 unit can irrigate 2-4ha) | 15,000 | 16500 | 17400 | 18,700 | 19900 | 21100 | 22,300 | 23500 | 24700 | 25,900 | 27100 | 28300 |
| Borehole tubewells (1 unit to irrigate about 5ha) | 8000 | 8500 | 9500 | 10167 | 10917 | 11667 | 12416.7 | 13167 | 13917 | 14667 | 15417 | 16167 |
| Rainwater harvesting (I unit to irrigate 2.5Ha - stores 30,000cu. mts) | 4500 | 5400 | 6000 | 6800 | 7550 | 8300 | 9050 | 9800 | 10550 | 11300 | 12050 | 12800 |
| Small-scale dams and reservors | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 | 285 |
| Medium scale dams & reservors | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 |
| Large scale dams and reservors | | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Irrigation Dev. Fund ('000US$) | 230 | 390 | 410 | 523 | 613 | 703 | 793 | 883 | 973 | 1063 | 1153 | 1243 |

Assumptions

- Component implementation actions will start in fiscal year 2005/06 and be implemented for 20 years to 2025. The first 5 years comprise the MKUKUTA first phase implementation schedule. The next years up to 2015 comprise MDGs and 2025 Development Vision.
- Open wells that can irrigate 2 – 4 hectares cost about US$ 3,500
- Borehole tube well that can irrigate up to 5 hectares cost about US$ 8,500
- Rainwater storage tank of 30,000 cu. metres can irrigate about 2.5 –5 hectares and cost US$ 4,500.
- Assumption is made that the Government will support private sector to establish irrigation and equipment leasing enterprises as well as manufacturing firms through a line of credit.

## 4.12 Fertiliser and Other Chemicals

*Introduction*

As discussed in Section One, a major problem facing Tanzania's agriculture is low productivity. Soil infertility and low labour productivity partly explains agriculture's low productivity. Therefore, selective use of organic and inorganic fertiliser is considered crucial in restoring soil fertility and improving productivity. Currently the use of fertiliser in Tanzania is about 7 kilograms per hectare plant nutrients compared with an average of 16 kilograms per hectare plant nutrients in SADC member countries and much more in developed countries. Even the small quantities of fertiliser used in the country are imported, despite known abundant natural resources for manufacturing fertiliser.

*Actions under MKUKUTA/MDGs*

Several actions are proposed under MKUKUTA/MDGs. First, the private sector will be encouraged to promote private sector supply of fertiliser to meet effective demand. Second, there will be a need to foster public-private partnership in production, procurement, and distribution of fertiliser. In this regard, private

sector investment in fertiliser production using locally available raw materials will be encouraged. The extension service will play a more active role in promoting selective use of organic and inorganic fertiliser taking into account environmental sustainability.

Table 4.18: Fertilizer Projections

| Type of Fertilizer | Unit | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Average/ year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DAP | Tons | 11640 | 12000 | 12500 | 13125 | 13500 | 14042 | 14542 | 15042 | 15542 | 16042 | 16542 | 154517 | 14047 |
| UREA | Tons | 26074 | 26880 | 28000 | 29400 | 30240 | 31453 | 32573 | 33693 | 34813 | 35933 | 37053 | 346112 | 31465 |
| CAN | Tons | 12571 | 12960 | 13500 | 14175 | 14580 | 15165 | 15705 | 16245 | 16785 | 17325 | 17865 | 166876 | 15171 |
| TSP | Tons | 9871 | 10176 | 10600 | 11130 | 11448 | 11907 | 12331 | 12755 | 13179 | 13603 | 14027 | 131027 | 11912 |
| NPK 25:5:5 | Tons | 4190 | 4320 | 4500 | 4725 | 4860 | 5055 | 5235 | 5415 | 5595 | 5775 | 5955 | 55625 | 5057 |
| NPK 20:10:10 | Tons | 4190 | 4320 | 4500 | 4725 | 4860 | 5055 | 5235 | 5415 | 5595 | 5775 | 5955 | 55625 | 5057 |
| NPK 10:18:24 | Tons | 13968 | 14400 | 15000 | 15750 | 16200 | 16850 | 17450 | 18050 | 18650 | 19250 | 19850 | 185418 | 16856 |
| Other chemicals | Tons | 18624 | 19200 | 20000 | 21000 | 21600 | 22467 | 23267 | 24067 | 24867 | 25667 | 26467 | 247226 | 22475 |

Notes

- Selective fertiliser use will increase by an average of 20% by 2010 and by 42% by 2015.
- The government is expected to enforce laws and regulations to safeguard farmers from supply of substandard fertilizer.

## 4.13 Plant Health

*Introduction*

The prevalence of crop pests and diseases reduces agricultural production and impacts heavily on the observed low productivity of agriculture. Pest outbreaks, particularly locusts, army worm, quelea quelea, and rodents are common in Tanzania. Pre-harvest losses attributed to pest and diseases range between 30-35%. In the case of pest outbreaks, losses can be as high as 100%. Similarly, post-harvest losses amount to a further 10-20% leading to decreased quality and quantity of produce. The large magnitude of these losses reduces farm incomes, increases food insecurity and is costly to the farmers and the country. The implementation of MKUKUTA/MDGs interventions is expected to reduce this problem.

*Actions under MKUKUTA/MDGs*

The main action under MKUKUTA/MDGs is to reduce the magnitude of losses associated with pests and diseases. Actions will be taken by the extension service to advise farmers on better low-cost pest management principles, including those related to better storage of farm produce. The private sector will be encouraged to supply selective pesticides, fungicides and other requisites for controlling pests and diseases. A line of credit will be made available where appropriate to ensure plant health services are not starved of credit in their quest to combat pests and diseases. In addition, the government will strengthen phytosanitary, guarantine and plant inspectoral services to prevent the spread of plant diseases and introduction of exotic plant pests, including alien species invasion that result from the importation of plant and plant materials. Further, the extension service will promote Integrated Pest Management philosophy

(cultural, biological, plant resistance and as a last resort chemical means) as a more sustainable approach to crop protection.

## 4.14 Seeds

*Introduction*

As discussed earlier, Tanzania's agriculture is characterised by low output and productivity. Quality seed is essential for increasing output as well as improving farm productivity. This is particularly important because the effectiveness of the other inputs such as irrigation, fertilisers and agro-chemicals depends largely on the use of quality seeds and other planting materials. The use of improved quality seed and other planting materials in Tanzania is very low – about 10%. Therefore over 90% of the farmers still use seeds selected from their previous output – a situation that has led to progressive deterioration of output. Thus, the main problem is insufficient production and distribution of improved quality seed varieties.

*Actions under MKUKUTA/MDGs*

The government will encourage the private sector to increase the production and distribution of improved seed variety and other planting materials through various incentives that will motivate greater investment in the seed industry. Capacity building will be undertaken to enable Tanzania Official Seed Certification Institute (TOSCI) to play a more pro-active role in ensuring seed that reaches farmers is of the desirable quality. Research and extension services will be stepped up to change farmers' mind-set towards adopting and growing improved seeds.

## 4.15 Agricultural Mechanisation

*Introduction*

As discussed in Section One, about 24.5% of Tanzania's arable land is under agricultural production. The average per capita land holding in Tanzania is very low, about 0.2 –2 hectares. The main limitation on area expansion is continued reliance on the hand hoe as the main cultivation tool. This not only constrains area under crop production, but also heavily impedes government efforts to achieve food security and reduce widespread poverty. Experience has shown that lack of adequate farm power is one of the most important constraint in the development of agriculture. The private sector has shown inadequate capacity to manufacture and distribute all types of farming tools, implements, machines and equipment. As a consequence, over 95% of the Tanzanian farmers continue to use the hand hoe – constraining both increased production and productivity. Actions under MKUKUTA/MDGs are expected to improve agricultural mechanisation and structures.

*Actions under MKUKUTA/MDGs*

Foremost will be to encourage the private sector to undertake the manufacture/importation and distribution of all types of farming tools, implements, machines and equipment. This is essential for expanding area under cultivation by turning idle arable land into productive use to achieve MKUKUTA/MDGs targets of increasing production, achieving food self-sufficiency, reducing

unemployment and reducing poverty. The second main action will be to increase on-farm processing machinery and more modern cultivation equipment to reduce drudgery and make agriculture more attractive to young people and investors. Within this framework it is expected that the extension service will develop messages to disseminate suitable animal traction, tractor, agro-processing, renewable energy and other farm structures to speed up adoption of mechanisation technologies.

Table 4.19: Farm Mechanisation Projections

| Machinery/ Equipment | Unit | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total Quantity | Average/year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tractor (70HP) | Number | 524 | 552 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1000 | 8276 | 752 |
| Heavy earth moving equipment (kungoa visiki) | number | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 86 | 8 |
| Ox | Number | 6118 | 6440 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 75558 | 6869 |
| Plough | Number | 6118 | 6440 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 75558 | 6869 |
| Ox-yoke and chain | Number | 6118 | 6440 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 75558 | 6869 |
| Ox cart | Number | 1573 | 1656 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 19429 | 1766 |
| Cultivator | Number | 26220 | 27600 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 323820 | 29438 |
| Harrow | Number | 175 | 184 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 2159 | 196 |
| Ox-ridger | Number | 6118 | 6440 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 75558 | 6869 |
| Hoe | Number | 39330 | 41400 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 485730 | 44157 |
| Flat shares | Number | 39330 | 41400 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 485730 | 44157 |
| Matches | Number | 39330 | 41400 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 485730 | 44157 |
| Axes | Number | 39330 | 41400 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 485730 | 44157 |
| Trek chain | Number | 8740 | 9200 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 107940 | 9813 |
| Donkey cart | number | 175 | 184 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 2159 | 196 |
| Ox-planter | | 175 | 184 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 2159 | 196 |
| Grain mills | Number | 87 | 92 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 1079 | 98 |
| Maize sheller | Number | 175 | 184 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 2159 | 196 |
| Oil expeller | Number | 105 | 110 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 1295 | 118 |
| Paddy/sorghum/wheat thresher | Number | 157 | 166 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 1943 | 177 |
| Sorghum dehuller | Number | 87 | 92 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 1079 | 98 |
| Rice extruder | Number | 70 | 74 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 864 | 79 |
| Forage chopper | Number | 26 | 28 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 324 | 29 |
| Groundnuts decorticator | Number | 17 | 18 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 216 | 20 |
| Cassava processing machine | Number | 13 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 162 | 15 |
| Grain cleaner | Number | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 54 | 5 |
| Feed mixer | Number | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 54 | 5 |
| Local farm implement manufacture | Number | | | | | | 1 | | | | | | 1 | |
| Horticulture processing plant | | | | | 1 | | | | | | 1 | | 2 | |

Notes

- Number of tractors will be increased by 43% by 2010 and doubled by 2015.
- Ox plough and other inputs will increase by an average of 14% by 2010.
- One farm implement manufacturing plant will be established before Phase one of MKUKUTA.
- Private firms will be encouraged to establish agro-processing plant.

## 4.16 Agro-Processing

*Introduction*

Agro-processing is the transformation of agricultural produce into different products that can be easily stored, marketed and consumed. It stimulates agricultural production through diversification of marketable products within and outside the country. In addition, agro-processing reduces produce losses, adds value to the product and generates rural and urban employment. Further, it reduces imports and improves nutritional status of the people.

*Actions under MKUKUTA/MDGs*

The private sector will be encouraged to establish agro-processing facilities through instituting an incentive-based investment package and line of credit. The government will support a public-private partnership in promoting rural-based methods of agro-processing especially for roots, tubers, fruits and vegetables and add value to extend their shelf life. Further, the government will support the formation of common interest groups (youths, women, retired officers, etc) to pull resources in order to establish and carry-out processing ventures.

## 4.17 Marketing

Efficient marketing of agricultural inputs and outputs is essential for realising MKUKUTA/MDGs targets. There are a number of constraints/problems that need resolution. In particular, the private sector is yet to respond fully and responsibly to the market liberalisation that has been undertaken by Tanzania. There are still administrative impediments to free market operations, particularly for food crops. Farmer organisations are weak and often do not function as democratic organisations. Due to weaknesses of farmer organisations, access to credit, markets and inputs on behalf of members is inadequate. Marketing infrastructure is inadequate, reducing market access and increasing marketing costs while compromising quality. In addition, agricultural taxation is too high, creating disincentives to using formal marketing systems and eroding agricultural profitability.

*Actions under MKUKUTA/MDGs*

Several actions will be undertaken as follows. Efforts will be made to promote farmer organisations that are democratic and functional. These organisations should be able to represent members' views on issues regarding inputs and outputs marketing and act as the basis for group marketing of produce and contract farming schemes where appropriate. Marketing infrastructure will be improved by encouraging public-private partnership to build quality market centres. These agricultural marketing centres are expected to be established in strategic areas such as:

- Makambako Grains fruits, vegetables, potatoes (for exports SADC market)
- Segera Fruits and vegetables (for exports to Middle East)
- Kibaigwa Grains, legumes and oil seeds
- Kigoma Palm oil, grains and cassava (for human and animal feeds)
- Isaka Legumes, paddy, oil seed
- Mtwara Cashew nuts, cassava

Agricultural taxation will be reviewed and steps taken to ensure greater incentives for domestic and foreign investment in agriculture. Further, steps will be taken to strengthen the legal and regulatory framework for agricultural marketing and trade (including awareness creation of regional and international trade agreements. Promote agro-processing and upgrade agricultural commodity markets. Develop and promote the use of risk management in the agricultural marketing. And conduct strategic research on market access for agricultural commodities and products in traditional and non-traditional markets. In addition, actions will be taken to facilitate promotion of private sector products in domestic, regional and international market. Strengthen agricultural markets research and intelligence. Monitor and evaluate the performance of the agricultural markets, marketing and trade system. Promote the establishment of strong producers and traders organization.

Other marketing-related interventions under MKUKUTA/MDGs will be as follows:

- Developing, improving and managing agricultural marketing infrastructure such as marketing centres, warehouses, and storage structures, and cooling facilities.
- Establishing and developing special agricultural export processing zones (agro processing parks) dealing with production and processing (including assembling, grading, packaging) for commodities like cashew nuts, oil seeds, fruits, vegetables, flowers and spices.
- Strengthening accreditation institution in agricultural commodities for export including certification agencies and analytical laboratories.
- Developing and strengthening agricultural marketing institutions including cooperatives, associations and groups at the local levels (Districts and Wards).
- Developing efficient and effective agricultural marketing information system up to the local level.
- Supporting private sector in agricultural marketing undertakings including capacity building in market risk management strategies (futures selling, insurance, commodity exchange, etc).
- Establishing effective agricultural marketing finance schemes for private sector.
- Establishing mechanisms to link producers and processors with markets.
- Developing domestic market for local agricultural products.
- Strengthening the Marketing Development Division including an establishment of an effective agricultural marketing extension, and building research and analytical capability of the departmental staff.
- Undertaking research on market opportunities in regional and international markets. The Ministry already has a memorandum of Understanding with the International Food Polity Research Institute (IFPRI) based in Washington.
- Undertaking research and promotion of best approaches to agricultural commodity and market risk management.
- Undertaking research on marketing structure, conduct and performance in agricultural marketing.

## 4.18 Cross-Sectoral Linkages and Synergies

Multiple and/or concurrent interventions (or investments) are required across many sectors to be able to achieve certain targets or goals in the agriculture sector. For example, land demarcation and titling are important in improving agricultural production and minimising land conflicts. This section makes an analysis of inter-sectoral linkages and services from other sectors.

### 4.18.1 Land

Agriculture is the main user of land resources in the country. Modernisation of agriculture requires that land tenure system is favourable in order to encourage long-term investment. This entails undertaking measures under MKUKUTA/MDGs that will ensure long-term access and ownership of land by all categories of investors, including large-scale farmers. Also importantly, there is land-use conflict between pastoralists, miners, and agriculturalists that has to be resolved to enhance peace and tranquillity in the country. The Agricultural lead ministries (ALM) will co-ordinate effectively with the Ministry of Lands and Human Settlement to step up demarcation of land for various activities based on suitability and carrying capacity. In addition, the ALM will work closely with Ministry of Lands to create conducive environment for large-scale agricultural investors to acquire land without much inconvenience.

In implementing the above, actions recommended under the Strategic Plan for the Implementation of Land Laws (SPILL) should be taken into account. In particular, Key Result Area No. 1 with respect to Land Tenure, Access and Land Rights. This intervention is costed by SPILL for about US$ 67 million. However, due to the importance of Land as a major resource for transforming agriculture, the interventions identified under SPILL that cost about US$ 273.5 million over the 15 year period to MDGs in 2015 has been included under the Agriculture Sector costing.

### 4.18.2 Water Sector

Agriculture is a major user of water resources. Rainfall provides much of the water currently used for agriculture but this source is becoming increasingly unreliable and uncertain. Therefore, there is increasing need for developing irrigation agriculture. This implies a much closer link with the water sector in order to ensure sustainable supply of water from various sources and use. In some areas rationing of water is inevitable to avoid denying water to other users. The ALMs will co-ordinate closely with the water sector ministry to ensure adequate and sustainable water supply to the agriculture sector. Water for irrigation purposes has been costed under Agriculture. However, water for other uses needed in the agriculture sector such as safe water for human consumption has been costed under the Water sector.

### 4.18.3 Health Sector

Health services are extremely important for increasing farmer productivity. The agriculture sector will collaborate with the health sector to ensure a wider coverage of health services including qualified medical personnel, equipment and drugs in rural areas. It is also important, especially in considering irrigation agriculture to take into account mitigation measures for vector control of water-borne diseases like malaria, bilharzias and the like. The cost of mitigation measures under irrigated agriculture has been costed under Agriculture Sector. However, cost for improving rural health systems have been costed under the Health Sector.

### 4.18.4 Education Sector

Modern agriculture is skill and knowledge-based. Since most Tanzanian farmers lack formal schooling, this is a handicap for increasing productivity in agriculture. Therefore interventions have to include the provision of adult literacy programmes, including provision of instruction materials, training of instructors and other facilities. Given that about 80% of the population is rural-based, it follows that much more resources should be allocated for adult education programmes in rural areas in contrast to current low levels. The education sector also needs to develop strategies for changing the mind-set of young educated people to like agriculture and take up farming upon completion of studies. The agriculture sector will collaborate with the education sector in this effort. Costing for undertaking adult education in rural areas has been costed in the Education Sector. Costing for facilitating adoption and application of new techniques and skills in agriculture has been costed under Agriculture Sector through the Extension Services component.

### 4.18.5 Energy Sector

Agriculture requires energy for on-farm processing and agro-processing. Farm machinery and equipments also require energy in the form of fuel and electricity. Collaboration with the energy sector is therefore important for the agriculture sector.

There is also a need to increase access to improved fuels, which will lower household demand for biomass and thereby contribute to slowing of land degradation, including deforestation and indoor and outdoor air pollution. Other interventions required include: electricity services for agriculture and other productive activities, policy interventions to support private sector participation in electricity provision. The ASLM will ensure close Coordination with the energy sector in order to facilitate the attainment of sectoral objectives. The Energy Sector should cost all energy requirements for the Agriculture Sector.

### 4.18.6 The Financial Sector

Agriculture requires reliable and accessible finance. Often financial institutions provide their services largely in urban centres, neglecting the rural sector. Apart from increasing the level of co-operation with the financial institutions to provide more credit to the agriculture sector, there is a need to develop more reliable development finance mechanisms for the sector, including Micro-Finance Institutions (MFIs) and SACCOS. The Ministry of Finance and Bank of Tanzania could play a liaison role to facilitate achievement of these interventions. This is essential, not only for facilitating agriculture, but also for poverty alleviation objectives. Ministry of Finance in collaboration with Ministry of Planning, Economy and Empowerment should cost Development Finance interventions because this aspects cuts across all sectors of the economy.

### 4.18.7 Private Sector

Agriculture is essentially a private sector activity facilitated by government. It is therefore important to develop a network of linked infrastructure support (land, roads, electricity, water, telecommunications, etc.) that will entice greater domestic and foreign investment in agriculture. Several agriculture-related "Trust Funds" have been costed under Agriculture Sector (Irrigation, Agro-processing, Farm Inputs, etc) to facilitate access to credit for the private sector to undertake major investments in the sector.

### 4.18.8 Trade and Industries

The agriculture sector has a direct linkage with trade and industries in attainment of MKUKUTA cluster 1 which is Growth and Reduction of Income Poverty. It has also a direct link to MDG 1 on eradicating of extreme poverty and hunger. Without improved marketing and trade agriculture cannot thrive well. Value addition is important for all agricultural out-put, requiring establishment of agro-processing industries. This will also increase farm incomes and provide greater incentives for investing in agriculture. Also develop linkage of agricultural output with regional and global markets through improved trade arrangements. Agriculture marketing has been costed under Agriculture Sector. Agro-processing has also been costed under Agriculture Sector to provide credit access to the private sector to undertake agro-processing activities. Other interventions should be costed under Trade and Industry Sector.

## 4.19 Cross-Cutting Issues

### 4.19.1 HIV/AIDS and Malaria

HIV/AIDS pandemic and malaria have aggravated the health status of Tanzanians, reducing life expectancies, eroding productivity, cutting down effective manpower and jeopardizing the future prospects of the country. This undermines the foundations of agricultural development and can exert a large constraint on attainment of MKUKUTA/MDGs targets and aspirations. The Tanzania HIV Indicator Survey (2003/04) indicates that 7% of Tanzanians aged between age 15-49 were already infected with the deadly virus. Women were more infected, about 8%, compared with 6% for men. Malaria cases are also on the increase.

*Actions under MKUKUTA/MDGs*

The Agricultural lead ministries in collaboration with other ministries and TACAIDS will step up awareness campaigns so as to contain further spread of HIV/AIDS and minimize its impact. Capacity building will be undertaken for the Extension Service to enable it play a more pro-active role in fostering behavioural changes. Also, there is need for promotion and utilisation of crops with high nutritive value for people living with HIV/AIDS. The ALMs will also liaison closely with the Ministry of Health in its MCH and other training to prevent mother-to-child transmission of HIV as a viable strategy for reducing infant and under-five mortality for the farming communities. Efforts to combat malaria will be stepped up through greater co-ordination of efforts by all ministries.

### 4.19.2 Gender

The agricultural sector is the single greatest employer, with women constituting the majority of the labour force. However, traditions and customs do not provide equal rights to both men and women. This is the main reason for the existence of gender disparity in agricultural communities. Men are traditionally regarded as heads of households, with greater access to resources. Women are often discriminated in terms of accessing and benefiting from resources like land, credit, education and labour, although existing statutory laws and regulations provide equal rights across gender categories.

*Actions under MKUKUTA/MDGs*

All Agricultural lead ministries will make a concerted effort to mainstream gender issues in all plans, strategies and operational activities. Further, the ALMs will promote equitable access to productive resources for youths, elderly, women and poor men. In addition, there is a need to ensure that resource mobilisation and allocation at domestic levels, in particular national budget process take relevant gender perspectives into and provide equitable opportunities for both women and men to voice their priorities and needs. Other strategic actions include: promoting household savings among the poor, taking into account specific constraints of specific groups, including in particular, women, youths and the elderly. Similarly, increase access to financial services and savings possibilities for small and medium size enterprises run by these groups.

### 4.19.3 Good Governance

Good governance is essential for the country to achieve its development goals as outlined in the National Strategy for Growth and Reduction of Poverty (MKUKUTA). Therefore it is important to make improvement in governance in the areas of economic policies, human rights, establishing well-functioning institutions, political participation and accountability and transparency in implementing all socio-economic activities. Actions required to support agricultural development in this area includes: supporting institutional reforms, training and improving accounting and auditing systems, improving management of farmers and livestock owner's associations and advocating increased involvement of stakeholders in planning and implementation to improve accountability and transparency in resource allocation and use.

### 4.19.4 Employment

Agriculture is the largest employer of labour, accounting for over 75% of the country's total employment. Excluding investments in agro-processing and irrigation, this costing exercise determined that an additional 28,485 jobs could be created annually under the investments proposed in this report (Chapter 4). The creation of jobs is linked with the operational target of reducing unemployment from 12.9% in 2000/01 to 6.9% by 2010 and address underemployment in rural areas as contained under Cluster 1 - Growth and Reduction of Income Poverty. It is hoped that as greater land is brought under irrigated agriculture and agro processing plants are developed; additional jobs will be created in agriculture. Further, as agriculture linked infrastructure improves, more people, including domestic and foreign investors will be lured to invest in agriculture, thus increasing direct and indirect employment in this sector.

### 4.19.5 Environment

Agricultural development is dependent on environmental resources such as land, forest, air, water and other resources. Sustainable utilisation of these resources is essential for the growth and sustainability of agriculture. However, Tanzania faces many problems with regard to the environment. Deforestation is turning the country into a desert, starving agriculture with much needed rainfall – as over 98% of agriculture production depends on rainwater. Poor farming techniques, especially the slash-and-burn system is bad for agriculture and the environment. Improper use of agro-chemicals not only destroys agricultural land but also is detrimental for the health of the people. Overgrazing is leading to widespread environmental damage, including soil degradation. These and other practices that have negative

environmental effects require urgent mitigation measures if targets under MKUKUTA/MDGs for agriculture are to be attained and sustained.

*Actions under MKUKUTA/MDGs*

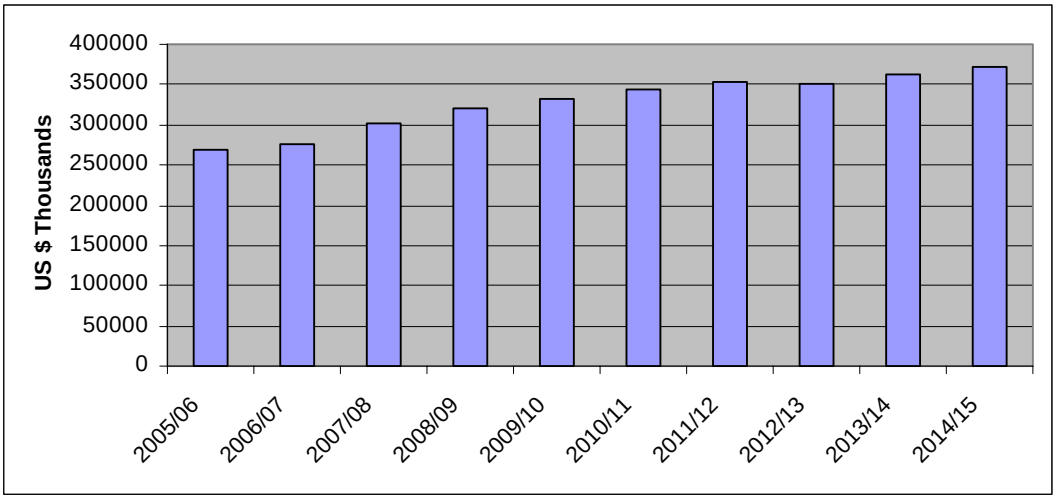
Actions will be undertaken to promote environmental awareness through a revitalized extension service. Research and extension services will encourage and advise farmers on sustainable use of agro-chemicals, while monitoring their use and taking remedial action as needed. The Extension service will also be responsible for promoting environmental friendly crop and livestock practices, including efficient use of irrigation water. Environmental early warning systems will be developed and coordinated in collaboration with other ministries and key institutions. Further, the ALMs will involve communities in resource management, land use planning and land use conflict resolution in an effort to achieve sustainable development of agriculture.

# 5.0 COST OF MKUKUTA BASED MDGS FOR AGRICULTURE

## 5.1 Summary

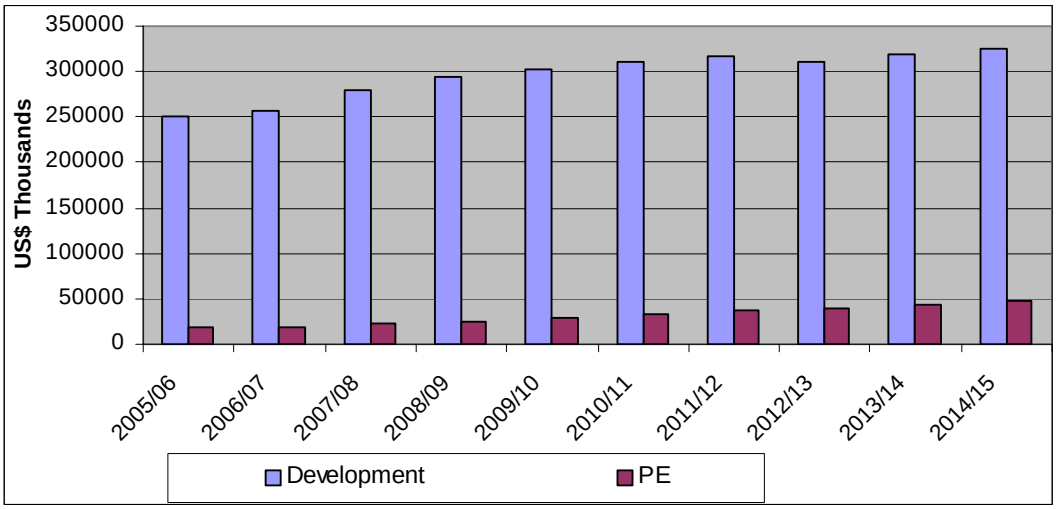
This section provides a summary costing of the interventions in the agriculture sector. The aim is to provide the magnitudes of the resources required to implement MKUKUTA and MDGs up to 2015. Details are excluded in the text and annexed to this report. Overall, as Figure 5.1 and Table 5.1 shows, total resource requirements for the agriculture sector is expected to increase by 23.1 percent from US$ 269.3 million in 2005/06 to US$ 331.4 million by 2010 (end of Phase 1 of MKUKUTA). By 2015 (end of MDGs), resource requirements are expected to have risen by 38.4 percent to US$ 372.6 million. The average projected yearly resource requirement is US$ 300 million during the MKUKUTA period up to 2010. Thereafter, yearly requirements average US$ 356 million up to the end of MDGs in 2015.

Figure 5.1: Total Projected Resource Requirements




Total Development Resources. The interventions envisaged to meet MKUKUTA/MDGs targets will require an average of US$ 275 million during the MKUKUTA period. During Phase 1 of MKUKUTA resource requirements will increase by 20.1 percent from US$ 251.5 million in 2005/06 to US$ 302 million by 2010. Thereafter, it is expected that an increase of about 29.4 percent will be achieved by 2015. (Figure 2 and Table 5.1).

Figure 5.2: Development and PE Resource Requirements




Personal emoluments (PE). PE for the agriculture sector is expected to increase by 64 percent, from US$ 17.8 million to US$ 29.3 million by 2010. By 2015 projections show that PE requirements will have tripled.

Crop Development Resource Requirements. The crop development interventions are expected to implement a large share of the envisaged interventions. As a consequence 47.5 percent of total projected resource requirements are expected to be channelled through MAFS. As Figure 5.3 illustrates, resource requirements are expected to increase by 22.6 percent from US$ 134 million in 2005/06 to US$ 164.5 million by 2010 and by 50 percent to US$ 200.8 million by 2015.

Livestock Development Resource Requirements. As Figure 4 illustrates, the resource requirement for Livestock Development is projected to reach an average of US$ 88.0 million per year during the MKUKUTA period up to 2010. Subsequently up to 2015 an average of US$ 85.0 million per year will be required to finance interventions in the livestock sub-sector.

Market Development Resource Requirements. The resource requirements for market development purposes is expected to increase by 30.7 percent from US$ 9.1 million in 2005/06 to US$ 11.9 million by 2010 (Figure 5). Subsequently additional resources will be required, which are expected to increase by 56 percent by 2015 to US$ 14.2 million.

Cross-sectoral and cross-cutting interventions. Resource requirements for implementing cross-sectoral interventions are expected to average US$ 30 million per annum. Main cross-sectoral interventions for implementation under agriculture include resources for improving land tenure systems, including implementation of the land laws (SPIL) for about US$ 27.3 million per year and on-farm roads improvement for about US$ 487,000 per year. Cross-cutting issues (gender, environment, HIV/Aids, Malaria and diseases that may be associated with irrigated agriculture are expected to require an average of US$ 2.3 million per year.

Figure 5. 3: Crop Development Total Resource Requirements

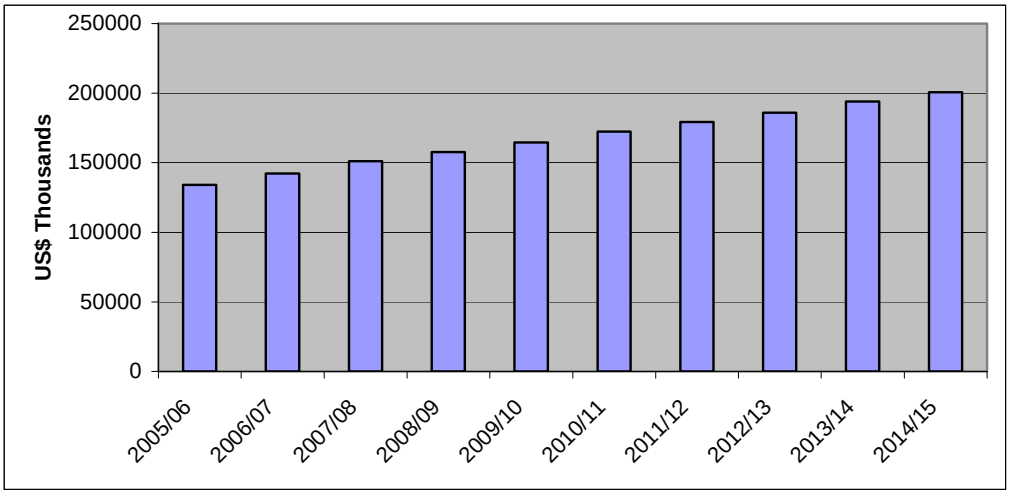



Figure 5.4: Livestock Development Resources requirements

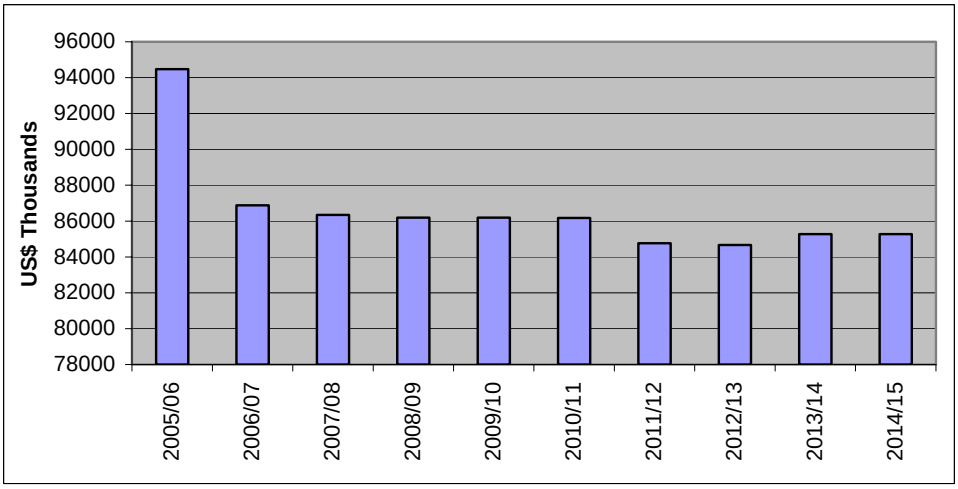



Figure 5.5: Market Development Resources Requirements

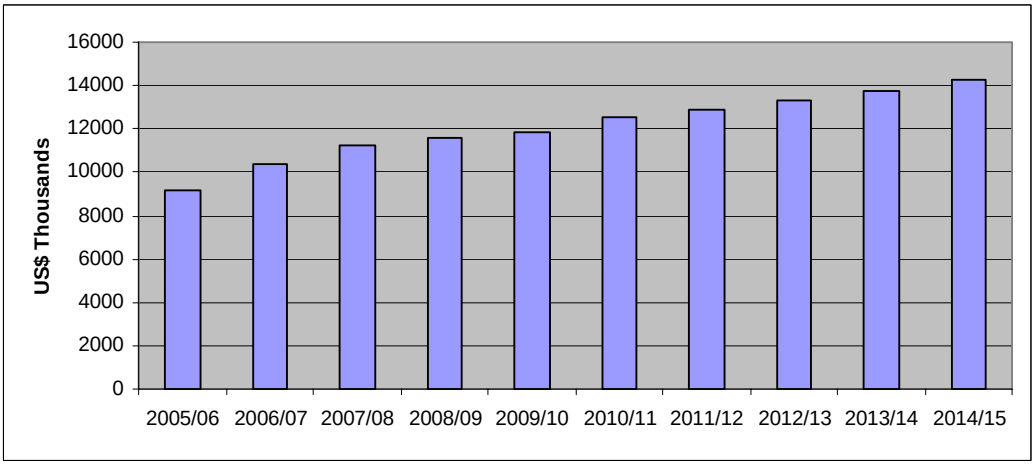


Table 5.1: Summary Projected Resource Requirements (in US$ '000)

| Intervention | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Projections/ Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CROP AND FOOD SECURITY PROJECTED RESOURCE REQUIREMENTS | | | | | | | | | | | | |
| Fertilizer & other chemicals | 16333 | 17376 | 18245 | 18766 | 19519 | 20214 | 20909 | 21604 | 22299 | 22994 | 198260 | 19826 |
| Plant protection | 3666 | 3900 | 3905 | 3926 | 3936 | 3949 | 3962 | 3975 | 3988 | 4001 | 39211 | 3921 |
| Extension Services | 8797 | 9359 | 10590 | 11535 | 12670 | 13758 | 14846 | 15934 | 17021 | 18134 | 132645 | 13264 |
| Research and crop development | 3657 | 3975 | 4379 | 5018 | 5568 | 6103 | 6663 | 7208 | 7768 | 8313 | 58651 | 5865 |
| Agricultural Irrigation | 41833 | 44035 | 45437 | 46278 | 47493 | 48614 | 49735 | 50857 | 51978 | 53100 | 479360 | 47936 |
| Agro-processing (factories) | 0 | 0 | 800 | 550 | 500 | 1050 | 500 | 400 | 750 | 200 | 4750 | 475 |
| Agricultural training institutes | 753 | 753 | 753 | 753 | 753 | 395 | 395 | 395 | 395 | 395 | 5740 | 574 |
| Strategic Grain Reserve Purchases | 7708 | 8200 | 8610 | 8692 | 8201 | 8611 | 8693 | 8202 | 8612 | 8694 | 84223 | 8422 |
| Subventions to Ministry Parastatals | 5264 | 5600 | 5880 | 5936 | 6141 | 6309 | 6477 | 6645 | 6813 | 6981 | 62048 | 6205 |
| Capacity building (national and local govt level) | 1974 | 2100 | 2205 | 2310 | 2415 | 2520 | 2625 | 2730 | 2835 | 2940 | 24654 | 2465 |
| Agr. Mechanisation Trust Fund | 27270 | 29010 | 30270 | 31530 | 34260 | 36010 | 37760 | 39510 | 41260 | 43010 | 849891 | 84989 |
| On-farm Processing Trust Fund | 12727 | 13539 | 14928 | 16488 | 18000 | 19626 | 21210 | 22836 | 24453 | 26079 | 189886 | 18989 |
| Agriculture Input Trust Fund | 4230 | 4500 | 4725 | 4860 | 5055 | 5235 | 5415 | 5595 | 5775 | 5955 | 51345 | 5135 |
| Sub-total | 134212 | 142347 | 150727 | 156641 | 164512 | 172395 | 179191 | 185891 | 193949 | 200797 | 2180663 | 218066 |
| | | | | | | | | | | | | |
| LIVESTOCK DEVELOPMENT PROJECTED RESOURCE REQUIREMENTS | | | | | | | | | | | | |
| Development resources | | | | | | | | | | | | |
| Range Development and Management (Land, Water and Pasture) | 7150 | 7150 | 7110 | 7110 | 7110 | 7080 | 7080 | 7080 | 7080 | 7080 | 71030 | 17695 |
| Animal Health | 22569 | 24319 | 24069 | 23769 | 23769 | 23769 | 23569 | 23569 | 23369 | 23369 | 236140 | 7200 |
| Livestock Research | 17941 | 8300 | 8300 | 8050 | 8050 | 8050 | 8050 | 7950 | 7950 | 7950 | 90591 | 3800 |
| Livestock Processing and Marketing | 11030 | 11030 | 11030 | 11030 | 11030 | 11030 | 11030 | 11030 | 11030 | 11030 | 110300 | 2866 |
| Livestock Extension | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 30000 | 15000 |
| Livestock Training | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 45000 | 7160 |
| Livestock Inputs Fund | 6200 | 6200 | 6200 | 6200 | 6200 | 6200 | 6200 | 6200 | 6200 | 6200 | 62000 | 6200 |
| Livestock Inputs | 6700 | 6700 | 6700 | 6700 | 6700 | 6700 | 6700 | 6700 | 6700 | 6700 | 67000 | 1627 |
| Livestock Information | 2500 | 2500 | 2500 | 2500 | 2500 | 2500 | 2500 | 2500 | 2500 | 2500 | 25000 | 15000 |
| Veterinary Investigation Centres | 1750 | 1750 | 1500 | 1200 | 1200 | 1200 | 1000 | 1000 | 800 | 800 | 12200 | 1758 |
| Improvement of Traditional Herds | 9640 | 9640 | 9640 | 9640 | 9640 | 9640 | 9640 | 9640 | 9640 | 9640 | 96400 | 6641 |
| Capacity Building (National and Local Govt Level) | 1500 | 1800 | 1800 | 2500 | 2500 | 2500 | 1500 | 1500 | 2500 | 2500 | 20600 | 2500 |
| Sub Total | 94480 | 86889 | 86349 | 86199 | 86199 | 86169 | 84769 | 84669 | 85269 | 85269 | 866261 | 87447 |
| | | | | | | | | | | | | |
| C CO-OPERATIVES AND MARKETING PROJECTED RESOURCE REQUIREMENTS | | | | | | | | | | | | |

| Intervention | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Projections/ Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Development resources | | | | | | | | | | | | |
| Marketing development infrastructure | 4800 | 5000 | 5400 | 5667 | 5967 | 6267 | 6567 | 6867 | 7167 | 7467 | 61167 | 6117 |
| Other marketing activities | 1091 | 1974 | 2250 | 2093 | 1870 | 1994 | 1863 | 1789 | 1717 | 1641 | 18281 | 1828 |
| Co-operative Development Support | 1450 | 1500 | 1590 | 1680 | 1770 | 1860 | 1950 | 2040 | 2130 | 2220 | 18190 | 1819 |
| Subventions to Ministry Parastatals | 1640 | 1700 | 1785 | 1870 | 1955 | 2040 | 2125 | 2210 | 2295 | 2380 | 20000 | 2000 |
| Capacity Building (national and local govt level) | 150 | 200 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 520 | 3390 | 339 |
| Sub-total | 9131 | 10374 | 11265 | 11589 | 11881 | 12521 | 12905 | 13345 | 13789 | 14227 | 121028 | 12103 |
| | | | | | | | | | | | | |
| CROSS-SECTORAL AND CROSS-CUTTING INTERVENTIONS FOR IMPLEMENTATION UNDER AGRICULTURE | | | | | | | | | | | | |
| Strategic Plan for the Implementation of Land Laws (SPIL)[8] | 11668 | 15232 | 29564 | 37300 | 37073 | 37073 | 36982 | 23345 | 23300 | 21936 | 273472 | 27347 |
| On farm roads improvement support[9] | 350 | 385 | 410 | 442 | 472 | 502 | 532 | 562 | 592 | 622 | 4867 | 487 |
| Gender[10] | 212 | 216 | 232 | 245 | 259 | 274 | 288 | 301 | 316 | 330 | 2673 | 267 |
| Environment [11] | 354 | 359 | 386 | 408 | 432 | 457 | 479 | 502 | 527 | 550 | 4455 | 446 |
| HIV/AIDS, Malaria & Water borne diseases[12] | 1061 | 1078 | 1159 | 1225 | 1295 | 1370 | 1438 | 1506 | 1582 | 1651 | 13366 | 1337 |
| Sub-total | 13645 | 17270 | 31771 | 39620 | 39531 | 39678 | 39719 | 26216 | 26317 | 25089 | 298856 | 29886 |
| Total (Development) | 251468 | 256880 | 280112 | 294050 | 302123 | 310762 | 316584 | 310122 | 319324 | 325383 | 3466808 | 319784 |
| PERSONNEL EMOLUMENT PROJECTED RESOURCE REQUIREMENTS (P.E.) | | | | | | | | | | | | |
| Total (P.E.) | 17824 | 18566 | 22149 | 25732 | 29314 | 32897 | 36480 | 40063 | 43645 | 47228 | 296074 | 32897 |
| | | | | | | | | | | | | |
| Grand Total | 269292 | 275446 | 302261 | 319782 | 331437 | 343659 | 353064 | 350185 | 362969 | 372611 | 3762882 | 352681 |

8 SPIL has been costed by Ministry of Lands, but included in the agriculture costing for implementation purposes. The detailed SPIL intervention investment plan document of April 2005 is available from the Ministry of Lands and Human Settlement.

9 Rural roads have been costed under the Ministry of Works.

10 Assumes at least 0.12% of the total resources allocated to agriculture will be used for gender activities.

11 Assumes at least 0.20% of the total agriculture resources will be used to address environmental concerns in the agriculture sector.

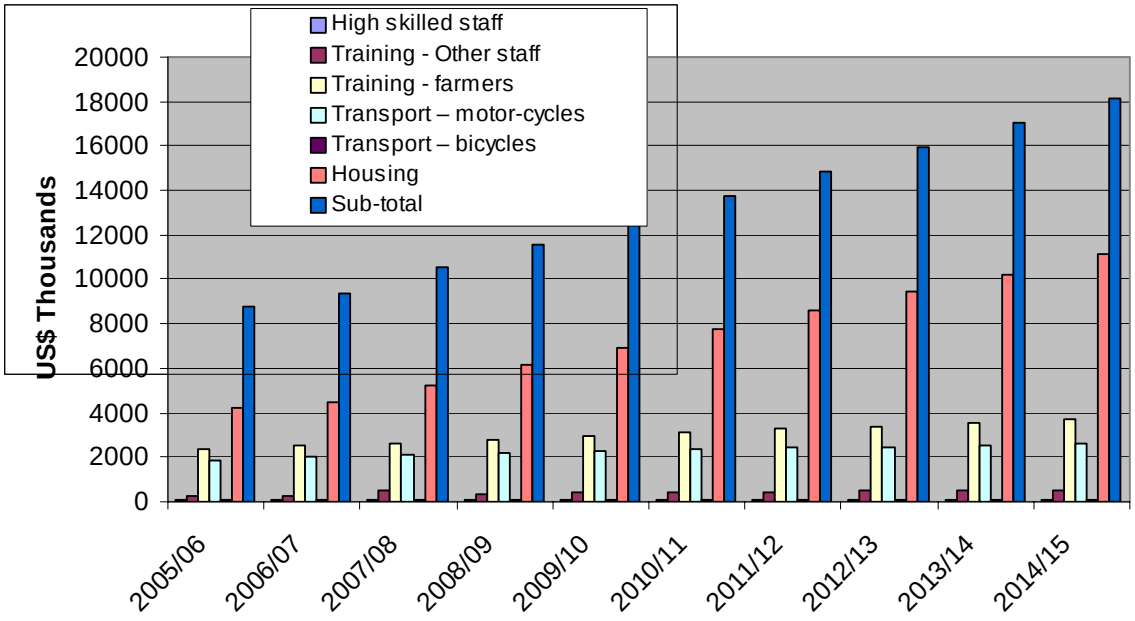
12 Assumes at least 0.60% of the total agriculture resources will be used to address HIV/AIDS, Malaria and water-borne diseases and health-related diseases in irrigated agriculture such as River Blindness.

## 5.2 Summary Resource Requirements for Key Interventions

### 5.2.1 Crop Extension Services

Considerable amounts of resources are needed to scale up and revamp the crop extension services. We project resource requirements increasing by 44 percent from US$ 8.8 million in 2005/06 to US$ 12.7 million by 2010 and a doubling of resources by 2015 to US$ 18.1 million. The main cost items and their increases by 2010 in bracket are: Housing US$ 4 million in 2005/06 to US$7 million by 2010 (75%); Training of farmers from US$ 2.5 million to US$ 3 million by 2010; and transport which averages US$ 2 million per annum (Figure 5. 6).

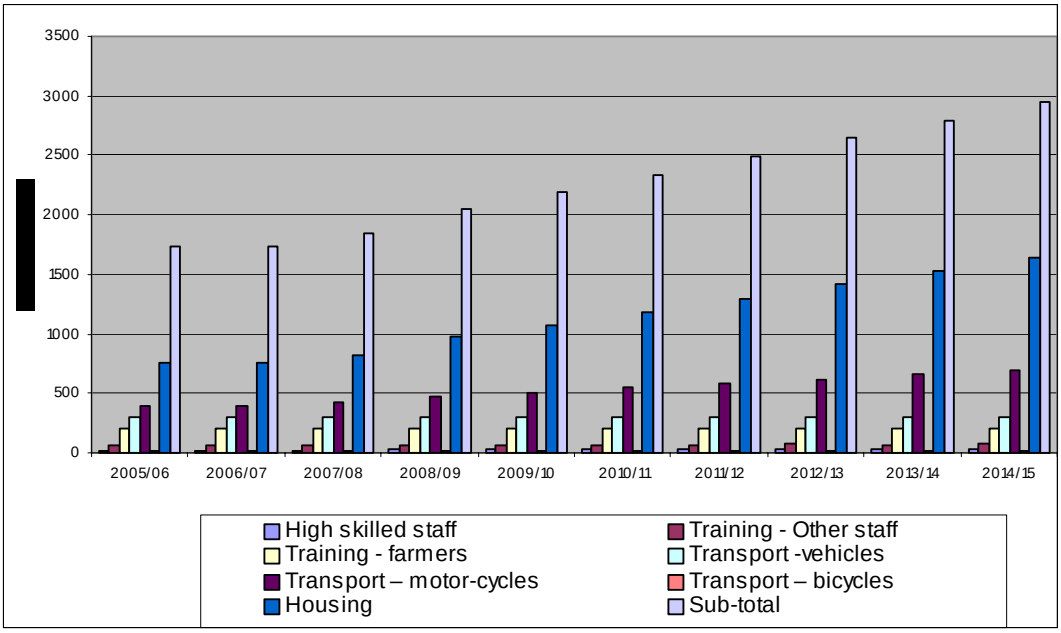
Figure 5.6: Resources required for Crop Extension Services




### 5.2.2 Livestock Extension Services

Considerable amounts of resources are also needed to scale up and revamp the livestock extension services. Resource requirements is expected to increase by 25.5 percent from US$ 1.7 million in 2005/06 to US$ 2.2 million by 2010 and to a further increase of 69 percent to US$ 2.9 million by 2015. The main cost items include housing, staff and farmer training and transport.

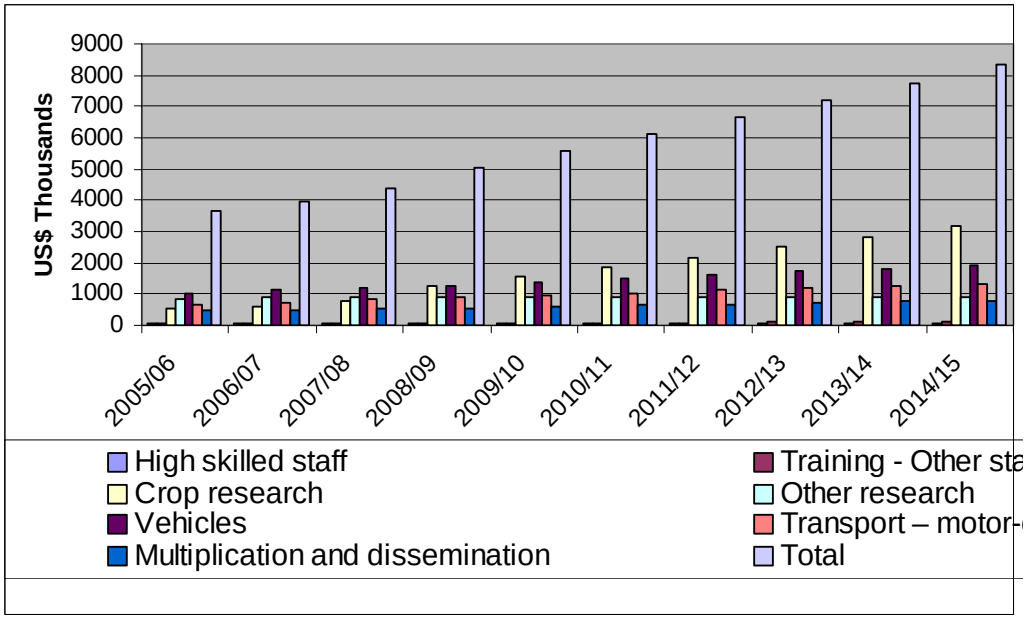
Figure 5.7: Resources required for Livestock Extension Services




### 5.2.3 Crop Research Services

Crop research services will be accelerated and already known findings disseminated to farmers. It is envisaged resource requirements will increase by 52 percent from US$ 3.6 million in 2005/06 to US$ 5.5 million by 2010 and thereafter resource requirements are expected to double by 2015. Main cost items include: actual research work which is expected to cost an average of US$ 1.7 million per year; transport and communications about US$ 2.5 million per year; multiplication and dissemination of research finding about US$ 630,000 per year and training of staff. (Figure 5.8).

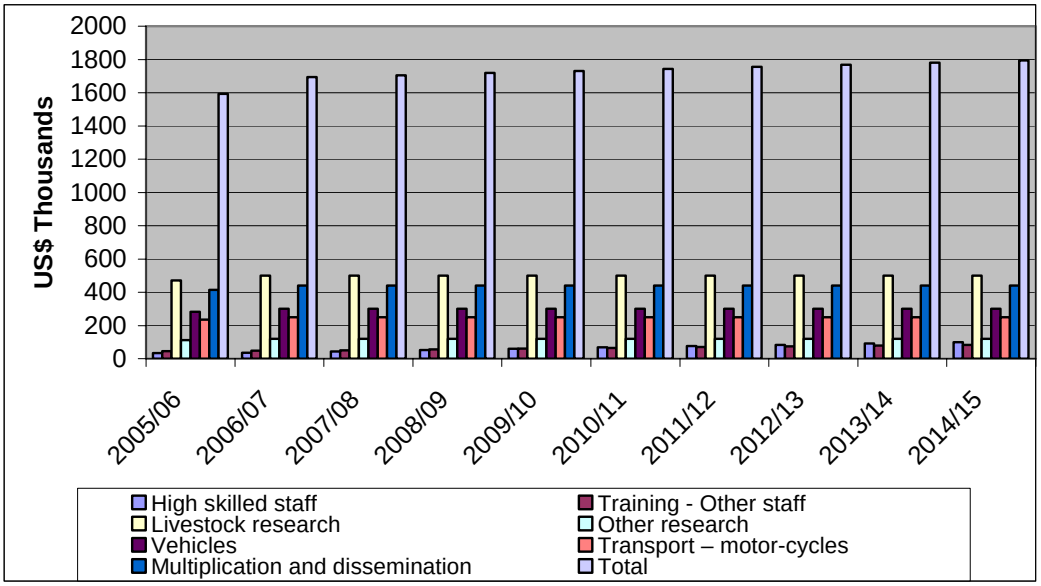
Figure 5.8: Resources required for Crop Research Services



### 5.2.4 Livestock research

Livestock research is also an area where resources will be increased during implementation of MKUKUTA/MDGs. Resource requirements are expected to increase by 8.7 percent from US$ 1.6 million in 2005/06 to US$ 1.7 million by 2010 and to a further 12.7 percent (US$ 1.8 million) by 2015 (Figure 5.9). The main cost items are: actual research which will cost an average of US$ 500,000 per year; multiplication and dissemination of research findings about US$ 440,000 per year; transport about US$ 300,000 per year and training of staff which is expected to cost and average of US$ 65,000 per year.

Figure 5.9: Resources required for Livestock Research Services

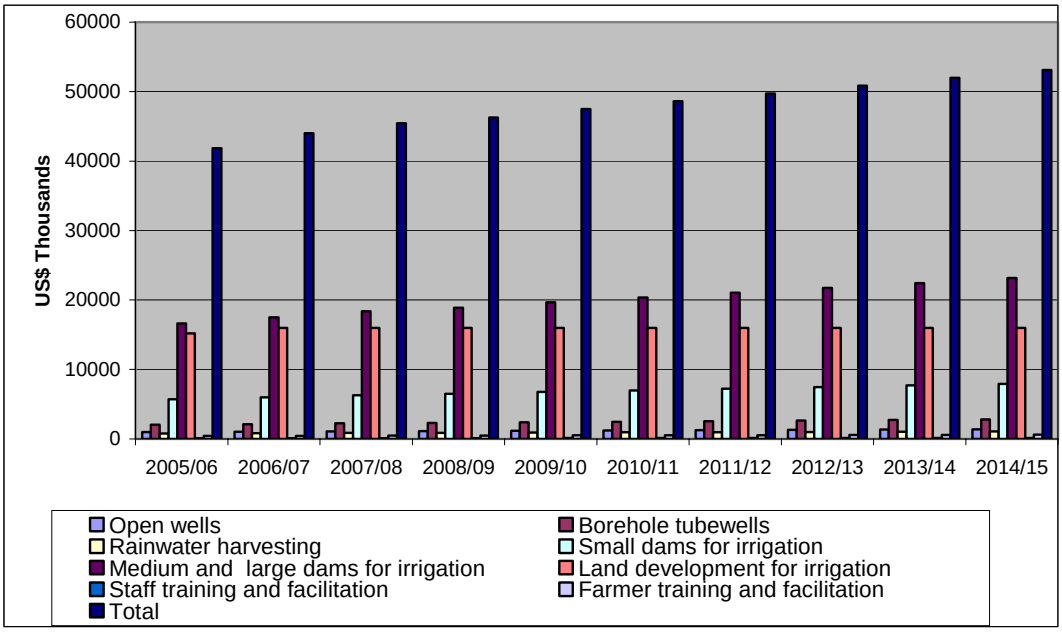



### 5.2.5 Irrigation

An important component of the strategy for agriculture growth and ending hunger by 2015 is concerted efforts to increase area under irrigation, due partly to the erratic and unreliable rainfall patterns of the country. This will require an increase of resources much beyond current levels. It is projected that resource requirements will increase by 13.5 percent from US$ 41.8 million in 2005/06 to US$ 47.5 million in 2010. Thereafter, a further increase of 30 percent to US$ 53.1 million is anticipated by 2015 (Figure 5.10).

The main cost items include: Over US$ 20 million annually for developing medium scale irrigation systems; over US$ 16 million annually for land development for irrigation; over US$ 6.8 million per year for small scale irrigation development; over US$ 3.5 million per year for open wells and bore hole irrigation systems, nearly US$ 925,000 per year to develop rain water harvesting irrigation systems and staff and farmer training which is expected to cost US$ 600,000 per year.

Figure 5.10: Resources required for Irrigation

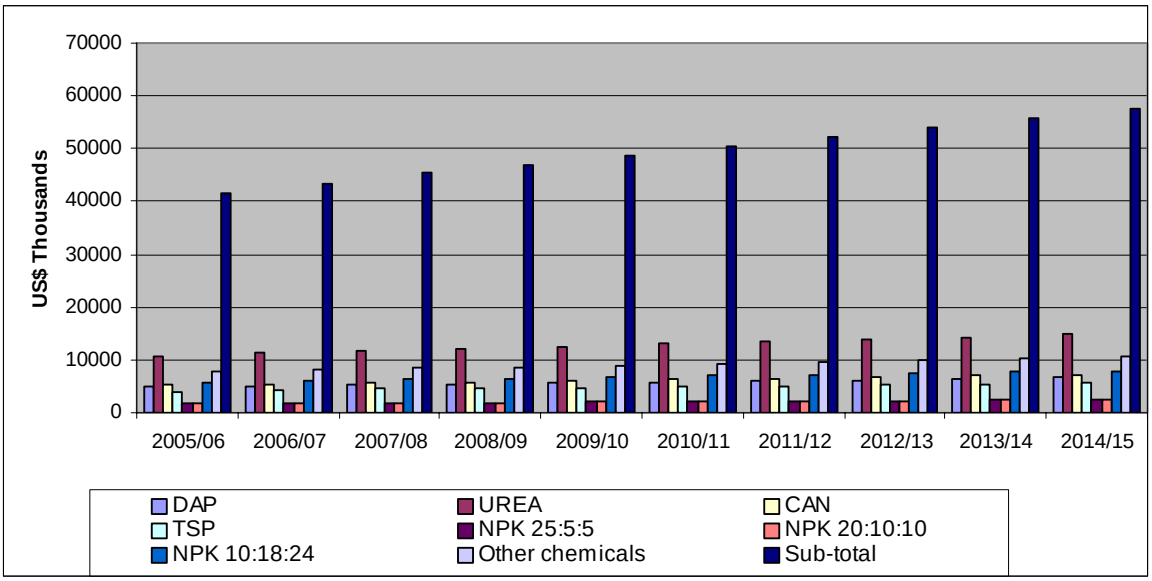



### 5.2.6 Fertilizer and other chemicals

Strategic use of selective and environmentally friendly fertiliser and other chemicals is also required to increase agriculture productivity and reduce unwarranted crop losses. Total resource requirements per year are expected to average US$ 50.5 million per year. It is assumed that of the total requirements Government subsidy will be about 40 percent or US$ 20 million per year. Based on that assumption, the portion of government resource requirements is projected to increase by 19.5 percent from US$ 16 million in 2005/06 to US$ 19.5 million by 2010 and to a further increase of 40.7 percent to US$ 23 million by 2015.

The main cost items with the annual average total resource requirements in brackets are: DAP (US$ 5.8 million); UREA (US$ 13.0); CAN (US$ 6.3 million); TSP (US$ 4.9 million); NPK: 25:5:5 (US$ 2.1 million); NPK: 20:10:10 (US$ 2.1 million); NPK: 10:18:20 (US$ 7.0 million); and other chemicals (US$ 9.3 million) (Figure 5.11).

Figure 5.11: Resources required for fertilizer and other chemicals




### 5.2.7 Mechanization

In order to modernise agriculture a total of over US$ 85 million per year will be required for agricultural mechanisation. It is expected that required resources for mechanisation will increase by 25.7 percent from US$ 27.2 million in 2005/06 to US$ 34.2 million by 2010. A further increase of 58 percent will by required or US$ 43 million by 2015.

The average cost per year for the main items is as follows: Tractor (US$ 27 million); cultivators (US$ 3.7 million); Ox plough and accessories (US$ 2.2 million); on-farm initial processing (US$ 4 million) and the construction of one farm implement production plant at about US$ 500 million.

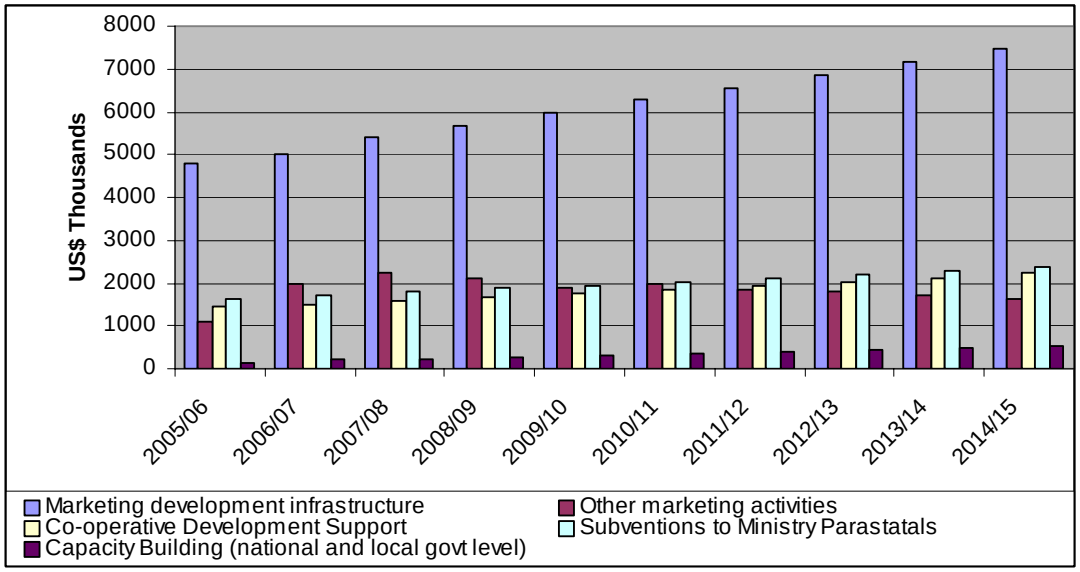
### 5.2.8 Agricultural Training Institutes

Under MKUKUTA/MDGs programmes, rehabilitation of agricultural training institutes will be undertaken. It is anticipated an average of US$ 574,000 per year up to 2015 will be required. The average cost per year for the main items include: Equipment and training materials (US$ 176,000); rehabilitation of dormitories and classrooms (US$ 92,000); transport (US$ 180,000); short term training (US$ 165,000) and long term training (US$ 50,000).

### 5.2.9 Agricultural Marketing

Under MKUKUTA/MDGs improvement in marketing infrastructure will be accorded priority. At least US$ 6 million will be required per year up to 2015 to improve marketing infrastructure. An additional US$ 1.8 million per year will be required for other marketing improvement activities, including marketing research and information. Co-operatives improvement activities will require US$ 1.8 million per year and capacity building for staff and farmers will require over US$ 339,000 per year (Figure 5.12).

Figure 5.12: Agricultural marketing interventions




### 5.2.10 Livestock Interventions

Efforts will be made during implementation of MKUKUTA/MDGs to increase resources required to improve animal health. Resources are expected to increase from US$ 22.5 million in 2005/06 to US$ 23.7 million in 2010 and to remain at about US$ 23.4 million up to 2015. The main cost items include: vaccinations, drugs and treatment which average over US$ 3.5 million per year; rehabilitation of dips and veterinary investigation centres, and establishment of check points to prevent the spread of diseases.

Range development and management will also be accorded priority. Resource requirements is expected to average US$ 7.1 million per year over the MKUKUTA and MDGs period up to 2015. Similarly, animal research will be revamped. An average of US$ 8.3 million will be required over the MKUKUTA and MDGs period.

It is envisaged that adequate resources will be solicited for improving livestock processing and marketing infrastructure. At least US$ 11.0 million per year will be required to finance this critical intervention. Further, animal research, extension and inputs supply will be improved to ensure high rate of growth of this sub-sector. Over an average of US$ 13 million per year will be required for these activities. In addition, it is envisaged that marked improvements in the traditional herd will require an average of US$ 9.6 million during the MKUKUTA/MDGs period. Capacity building at all levels will be undertaken and may require US$ 2.5 million per year.

# 6.0 FINANCING STRATEGY

## 6.1 Overview

Increased investment in the agricultural sector is required during implementation of MKUKUTA. While there is ample justification for some major increase of public investment in the agriculture sector, two main considerations need to be taken into account. The first is that it is vital to increase investment by the private sector. The second is that pumping money through the public sector, though important, requires the absorptive capacity to utilize such investments effectively. While the first vitally depends on elements in the second, and much of the aim of MKUKUTA is to facilitate this process, the second needs to be critically examined for content and priority. Indeed, as capacity building is very much part of the investment programme in the public sector.

## 6.2 Analysis of the Current Financing Situation (Govt Budget, PER/MTEF, JAS)

Policy and institutional reforms in 2000/01 continued to focus on decentralization process (i.e. giving Local Government Authorities more autonomy in order to gradually allow the grassroots to take the lead in socio-economic development). Thus, the Prime Minister's Office – Regional Administration and Local Government (PMO-RALG) has been charged with the responsibility of providing social and infrastructural services to the regions including education, health, water and rural roads, all which have an impact on the agricultural sector. These operations are financed through allocations made by the central government (although personnel expenses including wages and salaries are still paid by respective ministries). Local governments under the decentralized administration set-up also have a mandate to generate revenue within their jurisdiction and finance development projects in the social and infrastructural spheres. However, these changes do not reflect a shift in channelling of public expenditure into the agricultural sector as a result of decentralization.

The agriculture overall budget (approved) for the past three years has shown an upward trend (Table 6.1). This is particularly the general trend for not only recurrent and development budgets, but also approved as well as actual expenditure.

Table 6.1: Total Expenditure (Local and Foreign-Funded) in Tshs

| Expenditure | 2002/03 Approved | 2003/04 Approved | 2004/05 Approved | 2005/06 Approved |
|---|---|---|---|---|
| Recurrent | 20,556,690,000 | 36,729,010,000 | 49,694,000,000 | 71,123,000,000 |
| Development | 53,979,890,000 | 35,348,910,000 | 32,538,000,000 | 66,769,000,000 |
| Total Recurrent and Development | 74,536,580,000 | 72,078,010,000 | 82,232,000,000 | 137,892,000,000 |

Source: Appropriation Books of Accounts for the Sector Ministries-and MTEF documents for 2002/03 – 2004/05.

The total recurrent and development approved expenditure fell by 3.2% between 2002/03 and 2003/04, then grew by 14% and 67% between 2003/04 and 2004/05 and 2004/05 and 2005/06 respectively. The value of additional expenditure is reflected in the increased/improved activities of research, extension, policy and regulatory works and advisory services.

## 6.3 Financing Gap

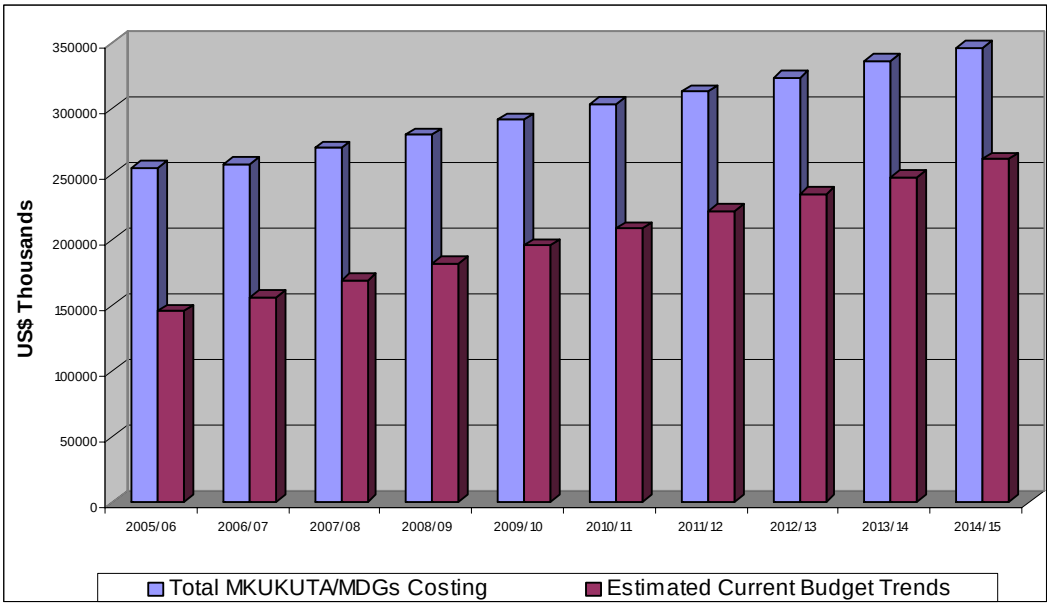
It is of most interest to determine the financing gap in meeting MKUKUTA/MDG targets. Based on the previous analysis of resources made under the PER/MTEF and JAS process, projected resource availability must be compared with the requirements for implementing interventions to achieve the identified MKUKUTA/MDGs targets. Under the assumptions of an annual increase in budget trends (under current PER/MTEF and JAS resource allocations), the financing gap for meeting MKUKUTA and MDGs targets narrows down in relative and absolute terms until 2015.

Table 6.2: MKUKUTA/MDGs Resource Requirements Compared with Budgetary Trends

| | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total MKUKUTA/ MDGs Costing | 255647 | 258176 | 270490 | 280162 | 291906 | 303981 | 313345 | 323968 | 336652 | 347522 |
| Estimated Current Budget Trends | 145724 | 156066 | 169249 | 182432 | 195614 | 208797 | 221980 | 235163 | 248345 | 261528 |
| Resource gap | 109923 | 102110 | 101241 | 97730 | 96292 | 95184 | 91365 | 88806 | 88307 | 85994 |
| Gap % of Requirements | 43.0 | 39.6 | 37.4 | 34.9 | 33.0 | 31.3 | 29.2 | 27.4 | 26.2 | 24.7 |

Source: Ministry of Finance and MTEF budget guidelines and computed projections

Figure 6.1: MKUKUTA Resource Requirements and Budgetary Trends



## 6.4 Financing Sources and Mechanism

MKUKUTA is a medium-term development strategy for economic growth and reduction of poverty and requires major commitment of sustainable financial and human resources. This section addresses the financing mechanisms available as well as the policy framework necessary to mobilize funding for the MKUKUTA with specific reference to the agricultural sector. The potential sources of finance and the financing mechanisms for development of the agricultural sector include the following:

Financing for Development of the Sector:

- Public Finance;
- Official Development Assistance (ODA);
- Debt Relief;
- Domestic Savings; and
- Foreign Direct Investment (FDI)

Financing Mechanisms

- Public-Private Partnerships (PPPs)
- Domestic Financial and Capital Markets
- Private Equity and Venture Capital

### 6.4.1 Financing for Development of the Sector

#### (i) Public Finance

In order to implement MKUKUTA, it will be imperative for the Government to improve on its public finance mobilization, expenditure and management system.

*Strategies*

*a) Maintenance of Macroeconomic Stability*

There is need to create and sustain macroeconomic stability by managing the macroeconomic fundamentals.

*b) Public Financial Management*

There is need to improve public financial management through fiscal prudence and financial discipline, and avoid financial imbalances. There is need to implement capacity building programmes in public finance management.

*c) Fiscal Management*

There is need to develop mechanisms for increasing revenues through strengthening tax administrations to efficiently collect taxes and to broaden the tax net. This will require development and implementation of programmes to strengthen the capacity of Government

*d) Good Economic Governance*

Good governance, including accountable and transparent public resource management, is fundamental in establishing credibility that will attract investment resource flows.

### (ii) Official Development Assistance (ODA)

Since domestic revenue is clearly insufficient to finance the implementation of the NSGRP and to reach the MDG targets, Official Development Assistance (ODA) will continue to play a key role as long as Tanzania remains a low-income economy. In the medium to long run, aid financed agricultural sector investments in human and physical capital are intended to strengthen the supply side of the economy as the basis for sustained growth.

*Strategies*

- Development and implementation of capacity building programmes at national level in the debt management, strengthening public budgeting and financial management and effective absorption of donor assistance.
- Advocate for increased levels of ODA, and the reforming of the aid-delivery system to ensure domestic ownership and improved coordination with domestic priorities, and to streamline the fragmented delivery system, and set-up mechanisms to engage OECD/DAC and other donor structures.

### (iii) Debt Relief

Debt relief is an important part of a comprehensive strategy to create the basis for sustained growth and poverty reduction. The resources made available as a result of debt relief initiative are a potential source of finance for the implementation of MKUKUTA including the agricultural sector component.

*Strategies*

- Strengthening debt management capacity of government in the area of coordination between debt and macroeconomic policies, implementation of debt strategies that are consistent with the objective of long-term debt sustainability, legal and institutional frameworks for debt management; and human and other capacity constraints.
- Promoting the development and application of standards in areas such as financial reporting, accounting and auditing, and improving the tracking and effectiveness of budget expenditures.
- Advocate for enhanced debt relief and encouragement of other creditors to participate in this framework.

### (iv) Domestic Savings and Investment

Savings and investment are central determinants of the rate and pattern of economic growth. In increasing domestic savings and using the resources in productive domestic investments. The country will strengthen its prospects for accelerated economic growth, poverty eradication and sustainable development. With regard to increasing domestic savings, fundamental conditions include the sound management of macroeconomic and budgetary polices. Furthermore, well developed and functioning financial markets and systems encourages savings. Effective protection and security of deposits for the general public through government regulation increases the tendency to save.

The country is characterized by a large informal sector in which activities and assets are unrecorded and which are also fragmented and/or segmented in terms of financial markets and services. Part of the problem stems from the high transaction costs of the private banking and non-banking institutions to provide financial services to the informal sectors, including emerging entrepreneurs, and poor households.

*Strategies*

- The Government can through appropriate financial regulatory mechanisms create the conditions for sound financial institutions and thereby improve the public trust in the financial institutions such that the public feels secure to place their savings with domestic financial institutions.
- Financial institutions should be encouraged to provide a fuller spectrum of financial services to households in both the formal and informal sectors as well as in both urban and rural settings. For this purpose, they could develop and implement programmes to encourage household savings such as through (i) revisiting minimum deposit levels and discretionary administrative fee structures in order to encourage small savers to use the formal financial sector institutions; and (ii) advertising campaigns.
- Government should encourage, directly and indirectly, the development of the micro finance sector to provide sustainable finance for the informal sector and financial services to the poor.

(v) Foreign Direct Investments (FDIs)

Efficiency-seeking investment requires adequate and efficient infrastructure services, a workforce with skill levels that allow for timely and cost-efficient production and delivery of goods and services. The most important development in international financial markets has been the increasing integration of world capital markets. Integration into global markets brings potential benefits in terms of increased market efficiency, access to the worldwide allocation of savings, speeding up of the process of financial innovation, the development of ways in which countries can hedge their economies against asset price instability, and allowing for greater depth and liquidity of financial markets, as well as increased access to foreign capital.

*Strategies*

- Attracting foreign investment requires that the country should be able to offer investment opportunities with a relatively higher return given a certain level of risk, or alternatively, a lower risk associated with investments providing a certain rate of return. What do investors expect to see when determining whether Tanzania has an attractive enabling investment environment?
- Stable and predictable political environment; macroeconomic stability; favourable regulatory environment; quality of economic infrastructure; competitiveness of the regional market; qualified human resources; efficient financial markets; investment protection against expropriation; and transparent legal system.

(vi) Development Finance

Development finance can play an important role in the implementation of the MKUKUTA. Development finance usually pertains to financing for investments in revenue-generating activities. It also makes a distinction between capital and recurrent expenditure with the application of development finance largely being confined to the initial capital outlay and the first cycle of working capital requirements, with future recurrent costs being covered through internal cash generation from the project or enterprise or through commercial working capital arrangements.

### 6.4.2 Financing Mechanisms

(i) Public-Private Partnerships

Public-private partnerships (PPPs) are effective financing mechanisms for development activities, especially infrastructure projects. In this respect, the availability of development finance over the medium-term is considered an important ingredient in ensuring: materialization of such PPP initiatives; developing PPP projects; undertaking financial structuring and packaging of projects; and mitigating the risks confronting PPP activities and projects.

*Strategies*

*a) PPP Policies, Strategies and Regulatory Frameworks*

There is need to develop and implement policies and strategies on PPPs and market these to key stakeholders including potential investors. There is need to create legislative frameworks conducive for the development of PPPs. A transparent regulatory framework on PPPs is essential including the pricing of services and exit regulations for the private sector.

*b) Re-balancing public-private sector production and ownership*

Private sector development and restructuring of State Owned Enterprises would stimulate capital market development and increase liquidity in the market. It also stimulates participation of the private sector in the economy, especially in productive areas.

*c) Promotion of Public-Private Partnerships in the provision of infrastructure and other services;* improve the provision of infrastructure services (telecom, energy, transportation, water and sanitation) either through better public provision of services or through effective PPPs.

*d) Capacity Building for PPP Development;*

PPP units or agencies are essential to implement PPP policies and programmes. Development of PPP skills is a key ingredient in the capacity building programme for PPPs promotion.

*e) PPP Options*

PPP policies and strategies should allow consideration of a full range of PPP options in order to ensure optimal choices depending on the situation at hand, including:

### (ii) Domestic Financial and Capital Markets

The presence of well-developed and robust financial systems will increase flows of foreign investment into the country. However, the Tanzania has a narrow range of intermediaries and limited financial instruments. The lack of liquidity, due to the limited number of market participants and the low market capitalization also poses a barrier to investment in securities, as it is difficult to determine a market price for an investment in an illiquid market and the investment risk increases owing to the additional risk that the investor may not be able to dispose of the investment at the expected price.

*Strategies*

- Governments can encourage the participation of the population in equity markets through the restructuring of State Owned Enterprises by offering part of the equity to the broader section of the population at a discount. Governments can also encourage private sector to spread the participation in shareholding to a broader section of the population whenever there is an Initial Public Offering (IPO).

### (iii) Private Equity and Venture Capital Funds

Private equity provides equity investment (risk capital) to enterprises not quoted on a stock market. It is used in developing new products and technologies, to expand working capital, to make acquisitions, or strengthen a company's balance sheet. Private equity also resolves ownership and management issues: a succession in family-owned businesses, or management buy-out or buy-in (MBO/MBI).

Venture capital, which is a subset of private equity, provides equity investment (risk capital) for early stage of business development including seed or launch, start-up, and early expansion.

*Strategies*

- Development and maintenance of a private equity and venture capital infrastructure including legal and regulatory framework, and government support to venture entrepreneurs.
- Promote development of venture capital industry associations to lead the creation of a conducive environment for development of a venture capital culture.
- Encourage development and implementation of pro-venture capital legal framework and taxation policies to facilitate structuring of venture capital funds.

## 6.5 Identification of "Quick Wins"

Agricultural transformation does not lend itself easily to "quick wins". Changing the mind-set of peasant farmers to adopt and implement new productivity-enhancing technologies takes time. The problem is monumental because most farmers have inadequate formal education and lack financial strength to translate intentions into action. This is exacerbated by lack of development finance mechanisms. Despite the problems identified above, the following areas should receive priority as possible "quick wins":

- Priority should be given to institutional strengthening investments. This should increase the capacity of the Agricultural Lead Ministries and Local Government Authorities to effectively implement the identified agricultural interventions under MKUKUTA and MDGs.

- Equally important is revamping the extension service and developing development finance mechanisms for supporting agricultural growth and development.

- It is also important to develop a comprehensive network of infrastructure support (roads, water, power supply, telecommunications, marketing, etc) that will create a more conducive environment for domestic and foreign investment in agriculture.

- Further, priority should be accorded on increasing investment in irrigated agriculture in order to make Tanzania less dependent on rain fed agriculture and create conducive environment for private sector participation in sustainable irrigation and better water management.

Other "Quick wins" identified in the Agriculture Sector Development Programme (ASDP) and MTEF that should receive priority in resolving the problem identified and increasing resource allocation on some specific interventions include:

- Rationalizing local tax levels and procedures,
- Simplifying trade and processing regulations,
- Strengthening local trade and market information systems,
- Business training and support services for small and medium enterprise development,
- Increasing focus on animal traction,
- Developing water harvesting potentials,
- Facilitating private sector and community participation in input procurement,
- Proactively increasing women's access to training and participation in decision making,
- Developing District Private Sector Investment Packages,
- Strengthening agricultural research extension and training; and
- Providing public recognition schemes for outstanding farmers and civil servants.

# ANNEXES

## Annex 1: Unit Costs (Exchange Rate: 1 Us$ = 1,100 Tshs.)

(Based on average market prices)

| Item | Measure | Unit cost (US$) | Item | Measure | Unit cost (US$) |
|---|---|---|---|---|---|
| Staff | | | Livestock Inputs/Equipment | | |
| Skilled staff salary | US$/Month | 250 | Improved breed cow | US$/unit | 182 |
| Unskilled staff salary | US$/Month | 100 | Improved breed pig | US$/unit | 73 |
| Casual labour salary | US$/day | 5 | Improved breed dairy goat | US$/unit | 55 |
| International consultants/experts | US$/month | 15,400 | Improved breed cockerel | US$/unit | 7 |
| Training of staff locally (short courses) | US$/Month | 200 | Vaccine | US$/unit | 0.1 |
| Training of staff locally (long courses) | US$/year | 1500 | Acaricide | US$/unit | 3 |
| Training long term abroad | US$/year | 20,000 | Drugs | US$/head | 2 |
| | | | Bull | US$/unit | 136 |
| Public Investment: | | | Cockerel | US$/unit | 5 |
| House | US$ | 15,000 | Air blast sprayer | US$/unit | 227 |
| 4 wheel drive vehicle | US$ unit | 25,000 | Diptanks | US$/unit | 727 |
| Motorbike | US$/unit | 2,000 | Cattle used as dairy cattle | % | 22 |
| Bicycle | US$/unit | 150 | Average milk production per daily cow | T/year | 0.18 |
| Computer unit (with Printer) | US$/unit | 10,000 | Cattle off-take rate | % | 11 |
| Office equipment furniture misc.) | US$/unit | 1364 | Average meat weight per head of cattle | T/unit | 0.1 |
| | | | Sheet off-take rate | % | 23 |
| Agricultural Equipment/Inputs | | | Average meat weight per head of sheep | T/unit | 0.0125 |

| Item | | | Measure | Unit cost (US$) | Item | Measure | Unit cost (US$) |
|---|---|---|---|---|---|---|---|
| Ox | | | US$/head | 136 | Goat off-take rate | % | 23 |
| Plough | | | US$/unit | 109 | Average meat weight per head of goat | T/unit | 0.0125 |
| Ox-yoke and chain | | | US$/unit | 11 | Average meat weight per pig | T/unit | 0.06 |
| Ox-cart | | | US$/unit | 73 | Average meat freight per chicken | T/unit | 0.0008 |
| Cultivator | | | US$/unit | 345 | | | |
| Harrow | | | US$/unit | 114 | Processing Equipment | | |
| Ox-ridger | | | US$/unit | 109 | Urban milling plant | US$/unit | 227273 |
| Jab planter | | | US$/unit | 27 | Hammer-mill | US$/unit | 4091 |
| Ripper | | | US$/unit | 68 | Household mill | US$/unit | 73 |
| Hoe | | | US$/unit | 3 | Oil-expeller | US$/unit | 2727 |
| Flat shares | | | US$/unit | 3 | Sorghum dehuller | US$/unit | 1364 |
| Matches | | | US$/unit | 1 | Milling plant capacity | T/year | 10,590 |
| Axes | | | US$/unit | 2 | Hammer-mill capacity | T/year | 490 |
| Trek chain | | | US$/unit | 5 | Hand-mill capacity/year | T/year | 20 |
| Tractor 70 HP | | | US$/unit | 30,000 | Oil-expeller capacity/year | T/year | 80 |
| Seed (average cost) | | | US$/unit | 182 | Sorghum dehuller capacity/year | T/year | 400 |
| Basal fertilizer | | | US$/ton | 400 | Cereals milling fee | US$/bag | 0.5 |
| Manure | | | US$/Cart | 4 | Oil expeller fee | US$/bag | 0.5 |
| Pesticide | | | US$/ton | 5,000 | Industrial oil-mill rehabilitation cost | US$/unit | 18182 |
| | | | | | Industrial oil-mill capacity | US$/unit | 7 |
| Agriculture Commodities | | | | | Oil press capacity | T/year | 15 |
| Maize | 100 kg/bag | 20,000 Tsh/bag | US$/ton | 182 | Oil press | US$/unit | 455 |
| Sorghum | 100 kg/bag | 16,000 Tsh/bag | US$/ton | 145 | | | |

| Item | | | Measure | Unit cost (US$) | Item | Measure | Unit cost (US$) |
|---|---|---|---|---|---|---|---|
| Millet | 100/kg/Tsh/bag | 16,000 Tsh/bag | US$/ton | 145 | Storage and Water Equipment | | |
| Rice | 100kg/bag | 60,000 Tsh/bag | US$/ton | 545 | Construction of silos | US$/T/Capacity | 45 |
| Wheat | 100 kg/bag | 45,000 Tsh/bag | US$/ton | 409 | Sheds | US$/T/Capacity | 27 |
| Bean/veg. (and other pulses) | | | US$/ton | 545 | Wells | US$/unit | 850 |
| Oilcrops: | | | | | Hand pump and installation | US$/unit | 545 |
| groundnut | | | US$/ton | 364 | Addit storage per credit | T | 5 |
| sesame | | | US$/ton | 318 | Storage capacity cold room | T | 40 |
| Sunflower | | | US$/ton | 227 | Storage capacity proc. Unit | T | 500 |
| Mix 20%. 20% and 60%, respectively | | | US$/ton | 227 | Storage capacity storage shed | T | 3,000 |
| Oils | | | US$/ton | 273 | Cost of storage | US$/ton | 14 |
| Cassava | | | US$/ton | 136 | Small dam for irrigation | US$/unit | 45,500 |
| Sweet potatoes | | | US$/ton | 227 | Large dam for irrigation | US$/unit | 350,000 |
| Bananas | | | US$/ton | 227 | Improvement of existing small dams (malambo) | US$/unit | 13600 |
| Sugarcane | | | US$/ton | 318 | | | |
| Milk | | | US$/ton | 300 | Forestry/Fishery | | |
| Meat | beef | | US$/ton | 2800 | Fishpond | US$ | 273 |
| | sheep/goat | | US$/ton | 1900 | Fuelwood | US$/m3/year | 1 |
| | poultry | | US$/ton | 4000 | Yld of fuelwood plantation | m3/year | 10 |
| | pork | | US$/ton | 1800 | Ann. Yld of natural forest | m3/ha/year | 5 |
| | mix 20%. 35%. 30% and 15%. Respectively | | US$/ton | 1800 | | | |
| Fish | | | US$/ton | 3000 | Cost of Production Benefit Rates (handcraft, industries) | | |
| World commodity prices | | | | | Fertilizer | US$/ton | 27 |

| Item | Measure | Unit cost (US$) | Item | Measure | Unit cost (US$) |
|---|---|---|---|---|---|
| Coffee "Arabica" | US$/ton | 2000 | Part of cereal incremental prod. marketed | % | 40 |
| Coffee "Robusta" | US$/ton | 720 | | | |
| Pyrethrum | US$/ton | 1500 | Gross margin for traders on food products | % | 35 |
| Sisal | US$/ton | 885 | Gross margin on ox equipment building | % | 25 |
| Tea | US$/ton | 1500 | Gross margin for traders on wood | % | 25 |
| Cashewnut | US$/ton | 950 | Avg. incremental income forge | US$ | 2 |
| Copra | US$/ton | 750 | Avg. incremental income tannery | US$ | 3.0 |
| Cotton | US$/ton | 1200 | Avg incremental income processing unit | US$ | 5.0 |
| Tobacco | US$/ton | 2100 | Avg. Incremental income pottery | US$ | 4 |
| Cocoa | US$/ton | 1800 | Avg incremental income/tailor | US$ | 3.0 |
| | | | Generation of employment - 1 empl. | US$ | 1000 |
| Transport Roads | | | | | |
| 40 tons truck | US$ unit | 136 | Percentage of Production Allocated to Seed and Feed or Lost | | |
| 10 tons truck | US$/unit | 45 | Maize | % | 15 |
| Transport (Road) | US$/km | 1 | Sorghum | % | 20 |
| Average km/year/truck | Km | 40,000 | Millet | % | 20 |
| Capacity/small trucks | tons | 10 | Rice | % | 15 |
| Capacity big trucks | tons | 40 | Wheat/other cereals | % | 12 |
| Truck load factor | capacity | 0.6 | Pulses | % | 15 |
| Transport (ox-cart) | US$/t/km | 15 | Oil crops | % | 12 |
| Average km/year/ox-cart | km | 500 | Oils | % | 80 |
| Capacity (ox-cart) | tons | 1.5 | Cassava | % | 15 |
| Petrol | US$/litre | 2 | Sweet potatoes | % | 25 |

| Item | Measure | Unit cost (US$) | Item | Measure | Unit cost (US$) |
|---|---|---|---|---|---|
| Cost for upgrading feeder roads | US$/km | 35,000 | Bananas | % | 15 |
| Cost for upgrading main roads | US$/km | 300,000 | Sugar | % | 90 |
| Cost bridge | US$/unit | 20,000 | Milk | % | 10 |
| | | | Meat | % | 5 |
| | | | Fish | % | 5 |
| Other Costs | | | | | |
| Complete workshop for repairs | US$/unit | 5,000 | | | |
| Set of farm implements (ox-ploughing) | US$/unit | 364 | | | |
| Mobile training Unit | US$/unit | 6,000 | | | |
| Water filers | US$/unit | 41 | | | |
| Cooking stoves | US$/unit | 14 | | | |
| Wheel barrows | US$/unit | 36 | | | |
| Water catchment (roof devices and tank) | US$/unit | 182 | | | |
| Radio Unit | US$/ unit | 12,000 | | | |
| Construction of large market centre | US$/unit | 1,700,000 | | | |
| Construction of medium scale market centre | US$/unit | 800,000 | | | |
| Construction of small scale market centre | US$/unit | 500,000 | | | |
| Local consultant | US$/month | 2,500 | | | |

## Annex 2: Agricultural Mechanisation

Purpose: To increase agricultural production through area expansion and better farming techniques

| Machinery/Equipment | Unit | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total Quantity | Average/ year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tractor (70HP) | Number | 524 | 552 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1000 | 8276 | 752 |
| Heavy earth moving equipment (kungoa visiki) | number | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 86 | 8 |
| Ox | Number | 6118 | 6440 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 75558 | 6869 |
| Plough | Number | 6118 | 6440 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 75558 | 6869 |
| Ox-yoke and chain | Number | 6118 | 6440 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 75558 | 6869 |
| Ox cart | Number | 1573 | 1656 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 19429 | 1766 |
| Cultivator | Number | 26220 | 27600 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 323820 | 29438 |
| Harrow | Number | 175 | 184 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 2159 | 196 |
| Ox-ridger | Number | 6118 | 6440 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | 75558 | 6869 |
| Hoe | Number | 39330 | 41400 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 485730 | 44157 |
| Flat shares | Number | 39330 | 41400 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 485730 | 44157 |
| Matches | Number | 39330 | 41400 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 485730 | 44157 |
| Axes | Number | 39330 | 41400 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 45000 | 485730 | 44157 |
| Trek chain | Number | 8740 | 9200 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 10000 | 107940 | 9813 |
| Donkey cart | number | 175 | 184 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 2159 | 196 |
| Ox-planter | | 175 | 184 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 2159 | 196 |
| Grain mills | Number | 87 | 92 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 1079 | 98 |
| Maize sheller | Number | 175 | 184 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 2159 | 196 |

| Machinery/Equipment | Unit | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total Quantity | Average/ year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oil expeller | Number | 105 | 110 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 1295 | 118 |
| Paddy/sorghum/wheat thresher | Number | 157 | 166 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 1943 | 177 |
| Sorghum dehuller | Number | 87 | 92 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 1079 | 98 |
| Rice extruder | Number | 70 | 74 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 864 | 79 |
| Forage chopper | Number | 26 | 28 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 324 | 29 |
| Groundnuts decorticator | Number | 17 | 18 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 216 | 20 |
| Cassava processing machine | Number | 13 | 14 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 162 | 15 |
| Grain cleaner | Number | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 54 | 5 |
| Feed mixer | Number | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 54 | 5 |
| Local farm implement manufacture | Number | 0 | 0 | | | | 1 | | | | | | 1 | 0 |

## Annex 3: Irrigation

Purpose: To improve farm productivity, food security and farm incomes by complementing rain-fed agriculture.

| Intervention | Measure | Unit cost | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Average/year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Open wells | (units: 1 unit can irrigate 2-4ha) | 3500 | 285 | 300 | 315 | 324 | 337 | 349 | 361 | 373 | 385 | 397 | 3,426 | 343 |
| Borehole tubewells | (1 unit to irrigate about 5ha) | 8500 | 238 | 250 | 263 | 270 | 281 | 291 | 301 | 311 | 321 | 331 | 2,855 | 286 |
| Rainwater harvesting | (I unit to irrigate 2.5Ha (Stores 30,000cu. mts) | 4500 | 171 | 180 | 189 | 194 | 202 | 209 | 217 | 224 | 231 | 238 | 2,056 | 206 |
| Small dams for irrigation | 1 unit to irrigate 20-50ha) | 50000 | 114 | 120 | 126 | 130 | 135 | 140 | 144 | 149 | 154 | 159 | 1,370 | 137 |
| Medium and large dams for irrigation | 1 unit to irrigate over 50 ha) | 350000 | 48 | 50 | 53 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 571 | 57 |
| Land development for irrigation | Ha | 2000 | 7600 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 79,600 | 7960 |
| Staff training and facilitation | Number trained | 500 | 190 | 200 | 210 | 216 | 225 | 233 | 241 | 249 | 257 | 265 | 2,284 | 228 |
| Farmer training and facilitation | Number trained | 300 | 1425 | 1,500 | 1,575 | 1,620 | 1,685 | 1,745 | 1,805 | 1,865 | 1,925 | 1,985 | 17,130 | 1713 |

## Annex 4: Fertilizer and Other Chemicals

| Type of Fertilizer | Unit | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Average/year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DAP | Tons | 11640 | 12000 | 12500 | 13125 | 13500 | 14042 | 14542 | 15042 | 15542 | 16042 | 16542 | 154517 | 14047 |
| UREA | Tons | 26074 | 26880 | 28000 | 29400 | 30240 | 31453 | 32573 | 33693 | 34813 | 35933 | 37053 | 346112 | 31465 |
| CAN | Tons | 12571 | 12960 | 13500 | 14175 | 14580 | 15165 | 15705 | 16245 | 16785 | 17325 | 17865 | 166876 | 15171 |
| TSP | Tons | 9871 | 10176 | 10600 | 11130 | 11448 | 11907 | 12331 | 12755 | 13179 | 13603 | 14027 | 131027 | 11912 |
| NPK 25:5:5 | Tons | 4190 | 4320 | 4500 | 4725 | 4860 | 5055 | 5235 | 5415 | 5595 | 5775 | 5955 | 55625 | 5057 |
| NPK 20:10:10 | Tons | 4190 | 4320 | 4500 | 4725 | 4860 | 5055 | 5235 | 5415 | 5595 | 5775 | 5955 | 55625 | 5057 |
| NPK 10:18:24 | Tons | 13968 | 14400 | 15000 | 15750 | 16200 | 16850 | 17450 | 18050 | 18650 | 19250 | 19850 | 185418 | 16856 |
| Other chemicals | Tons | 18624 | 19200 | 20000 | 21000 | 21600 | 22467 | 23267 | 24067 | 24867 | 25667 | 26467 | 247226 | 22475 |

## Annex 5: Agricultural Training Institutes

Purpose: To rehabilitate and modernise the institutes in order to play a better role in agricultural transformation.

| Intervention | Measure | Unit cost | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Average/ year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rehabilitation | Classrooms/dormitories | 10000 | 2 | 2 | 2 | 2 | 2 | | | | | | 10 | 2 |
| | Halls & kitchens | 8000 | 2 | 2 | 2 | 2 | 2 | | | | | | 10 | 2 |
| | Utility systems | 10000 | 2 | 2 | 2 | 2 | 2 | | | | | | 10 | 2 |
| | Labs & workshops | 8000 | 2 | 2 | 2 | 2 | 2 | | | | | | 10 | 2 |
| | Farm structures | 5000 | 2 | 2 | 2 | 2 | 2 | | | | | | 10 | 2 |
| Retooling | Furniture | 20000 | 2 | 2 | 2 | 2 | 2 | | | | | | 10 | 2 |
| | Glassware | 10000 | 2 | 2 | 2 | 2 | 2 | | | | | | 10 | 2 |
| | Lab equipment | 12000 | 2 | 2 | 2 | 2 | 2 | | | | | | 10 | 2 |
| | Communication networks | 8000 | 2 | 2 | 2 | 2 | 2 | | | | | | 10 | 2 |
| | Farm machinery and implements | 50000 | 2 | 3 | 3 | 3 | 3 | | | | | | 14 | 3 |
| Long term training | Number trained | 2500 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 200 | 20 |
| Short-term training | Number trained | 1500 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 990 | 110 |
| Transport | Vehicles | 15000 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 108 | 12 |

## Annex 6: Agricultural Marketing

| Intervention | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Total | Av./year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Strengthen the legal and regulatory framework for agricultural marketing and trade | 64 | 116 | 132 | 123 | 121 | 118 | 110 | 105 | 98 | 92 | 1,080 | 108 |
| Promote agro-processing and up-grading in agricultural commodity markets | 187 | 339 | 386 | 359 | 352 | 345 | 321 | 308 | 295 | 282 | 3,174 | 317 |
| Develop and promote the use of risk management in the agricultural marketing | 43 | 78 | 89 | 82 | 81 | 71 | 68 | 65 | 62 | 59 | 696 | 70 |
| Conduct strategic research on market access for agricultural commodities and products in traditional and non-traditional markets | 108 | 196 | 223 | 208 | 20 | 199 | 185 | 178 | 171 | 163 | 1,652 | 165 |
| Facilitate promotion of private sector products in domestic regional and international market | 186 | 337 | 384 | 357 | 350 | 343 | 319 | 306 | 293 | 281 | 3,157 | 316 |
| Strengthen agricultural markets research and intelligence | 119 | 215 | 245 | 228 | 223 | 219 | 204 | 195 | 187 | 179 | 2,014 | 201 |
| Monitor and evaluate the performance of the agricultural markets, marketing and trade system. | 46 | 84 | 95 | 89 | 89 | 85 | 79 | 76 | 79 | 76 | 798 | 80 |
| Promote the establishment of strong producers and traders organization | 79 | 144 | 164 | 152 | 149 | 146 | 136 | 131 | 125 | 120 | 1,346 | 135 |
| Promote development and improvement of agricultural marketing infrastructure (public-private partnership | 65 | 117 | 133 | 124 | 121 | 110 | 111 | 106 | 102 | 97 | 1,085 | 109 |
| Facilitate development and strengthening agriculture marketing institutions at the local and national levels | 193 | 350 | 399 | 371 | 363 | 357 | 331 | 318 | 305 | 291 | 3,278 | 328 |
| Marketing development infrastructure | 4800 | 5000 | 5400 | 5667 | 5967 | 6267 | 6567 | 6867 | 7167 | 7467 | 61,167 | 6,117 |
| Co-operative Development Support | 1450 | 1500 | 1590 | 1680 | 1770 | 1860 | 1950 | 2040 | 2130 | 2220 | 18,190 | 1,819 |
| Subventions to Ministry Parastatals | 1640 | 1700 | 1785 | 1870 | 1955 | 2040 | 2125 | 2210 | 2295 | 2380 | 20,000 | 2,000 |
| Capacity Building (national and local govt level) | 150 | 200 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 520 | 3,390 | 339 |
| Total | 9131 | 10374 | 11265 | 11589 | 11881 | 12521 | 12905 | 13345 | 13789 | 14227 | 121028 | 12103 |