

FINAL REPORT

REPUBLIC OF RWANDA



**MINISTRY OF AGRICULTURE AND ANIMAL RESOURCES
(MINAGRI)**

National Dairy Strategy

April 2013

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ACRONYMNS

AfDB	African Development Bank
AGDP	Agricultural Gross Domestic Product
AGRA	Alliance for a Green Revolution in Africa
AI	Artificial Insemination
AMS	Alternative Milk Sector
AU-IBAR	African Union - Inter-Agency Bureau for Animal Resources
BCR	Banque Commerciale du Rwanda
BCR	Benefit Cost Ratio
BK	Bank of Kigali
BMGF	Bill and Melinda Gates Foundation
BPR	Bank Populaire Rwanda
BRD	Banque Rwandaise de Developpement
CAADP	Comprehensive African Agriculture Development Plan
CAHW	Community Animal Health Workers
CET	Common External Tariff
CIP	Crop Intensification Program
COMESA	Common Market for East and Southern Africa
COP	Costs of Production
DQAL	Dairy Quality Assurance Laboratory
DRC	Democratic Republic of the Congo
DS	Dairy Strategy
DSWG	Dairy Sector Working Group
EAC	East African Community
EADD	East African Dairy Development
EDPRS	Economic Development and Poverty Reduction Strategy
FFS	Farmer Field School
FMD	Foot and Mouth Disease
GDP	Gross Domestic Product
GOR	Government of Rwanda
HI	Heifer International
ICRAF	International Center for Research on Agro-Forestry
IFAD	International Fund for Agricultural Development
IFCN	International Farm Comparison Network
ILRI	International Livestock Research Institute
IMIHIGO	District Development Government
LF	Lead farmer
LISP	Livestock Infrastructure Support Program
LOL	Land O'Lakes, Inc.
MCC	Milk Chilling Center
MDG	Millennium Development Goals
MFI	Micro-Finance Institution
MINAGRI	Ministry of Agriculture
MINECOFIN	Ministry of Finance
MINEDUC	Ministry of Education
MINICOM	Ministry of Trade and Industry
MININFRA	Ministry of Infrastructure
MINALOC	Ministry of Local Government
MINISANTE	Ministry of Health
MOVI	Measurable Objectively Verifiable Indicator

MSME	Micro, Small and Medium Enterprises
NAEB	National Agricultural Export Board
NDFFR	National Dairy Farmers Federation of Rwanda
NDFU	Nyagatare Dairy Farmers Union
NDS	National Dairy Strategy
NGO	Non-Governmental Organization
OIE	Organization International Epizootic
OVI	Objectively Verifiable Indicator
PHHS	Post-Harvest Handling Systems
PLWA	People Living with AIDS
PMP	Performance Monitoring Plan
PPP	Public-Private Partnership
PSF	Private Sector Federation
PSTA-III	Strategic Plan for the Transformation of Agriculture in Rwanda – Phase III
RAB	Rwanda Agricultural Board
RADD	Rwanda Agro-Dealers Development
RALIS	Rwanda Agriculture and Livestock Inspection Service
RBS	Rwanda Bureau of Standards
RDB	Rwanda Development Board
RDCP-II	Rwanda Dairy Competitiveness Program - II
REMA	Rwanda Environmental and Management Agency
RFRIP	Rwanda Feeder Roads Improvement Program
RNDB	Rwanda National Dairy Board
RNDB-S	Rwanda National Dairy Board-Secretariat
RNDP	Rwanda National Dairy Platform
SACCO	Savings and Credit Cooperative
SCC	Somatic Cell Count
SMP	Skim Milk Powder
SNV	SNV - Netherlands
SOA	Seal of Approval
SoQ	Seal of Quality Program
UHT	Ultra-Heat Treatment
VAT	Value Added Tax
WDA	Workforce Development of Rwanda
WFP	World Food Program
WMP	Whole Milk Powder

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EXECUTIVE SUMMARY

The dairy subsector is important to the economic development of Rwanda, and dairy offers a pathway out of poverty for large numbers of households keeping livestock and for those who provide services and value addition throughout the supply chain. The current "farm gate" value of milk is approximately Rwf 79.7 billion (US\$129.70 million). The dairy subsector contributes 15 percent to agricultural gross domestic product (AGDP) and 6 percent to gross domestic product (GDP). Dairy's contribution to GDP is likely underestimated when considering ancillary products that can be attributed to dairy, e.g. hides, meat, traction/carting and manure. Dairy is a strategic commodity for Rwanda.

The Government of Rwanda (GOR) in its Vision 2020 set the country on a course in 2000 to become a middle-income country by the year 2020. The country has achieved significant positive growth since 2001 with 7 to 8 percent average annual rates of growth in GDP. Vision 2020 has six pillars and three cross-cutting issues, and dairy supports each pillar and cross-cutting issue directly or indirectly with its contribution to GDP, household income, and job creation, just to mention a few of the impacts.

This National Dairy Strategy (NDS) is timely because of its contribution to the Strategic Plan for the Transformation of Agriculture in Rwanda – Phase III (PSTA-III) being prepared for the Economic Development and Poverty Reduction Strategy (EDPRS). A number of meetings were held with stakeholders in both the public and private sectors to guide the preparation of the NDS. For this reason, the NDS is a "living" document to be used by stakeholders in both the public and private sectors in preparing, planning, allocating budgets and implementing policies. The NDS is also timely because the dairy subsector faces pressing challenges (and opportunities) over the next five years. The NDS is a roadmap to identify potential roadblocks and to prepare for removing them. Several challenges facing the subsector are as follows:

- The number of improved dairy cattle will increase and the potential exists for the production of 650,000 mt of milk in 2017 without NDS interventions.
- An adequate supply of feed and the knowledge of how to prepare feed rations are challenges to improving productivity for dairy producers.
- Costs of production (COP) of milk in Rwanda are higher than in neighboring Kenya and Uganda, where production and processing benefits from economies of scale and the farm to consumer cold chain is better developed. This, combined with the transport costs required to reach these markets, makes Rwanda's milk less than price competitive to trade in these countries. However, there appear to be market opportunities to the west, in Burundi and the Democratic Republic of Congo (DRC), where production and processing are under-developed and milk COP is relatively high.
- The marketing costs beyond the farm gate to final domestic consumers are also high. Farmers' share of the final retail price is low (less than 30% for milk sold through the alternative milk sector (AMS) to less than 20% if farmers' milk is sold through the formal sector) when compared to international standards of 50 percent. This is due to both the scale of production and processing as well as development of the cold chain.

- On the demand side, consumer demand for both raw and processed milk is not increasing fast enough to clear the projected supplies of raw milk because of affordability, accessibility and availability of milk.
- Milk quality is an issue of concern for the majority of milk marketed through the AMS and this limits domestic and export market opportunities.
- The retail price of processed dairy products is high compared to milk in the AMS, which impacts demand and diverts consumers to purchasing "loose" milk (unpasteurized).
- The GOR does not currently have a dairy policy, and private stakeholders in the dairy subsector are not organized or able to effectively advocate for needed regulations and investments.

The NDS takes a balanced demand and supply side approach with a market-driven orientation. Production and marketing have to be in lockstep so that production does not outpace marketing. At the same time, the GOR has placed the country on a path to being a middle-income economy. This goal creates certain expectations from the GOR for the dairy subsector to reduce poverty and also provide an affordable, wholesome food supply. The dairy subsector is poised to deliver on the GOR's vision.

The NDS identifies the necessary policies for achieving the production and marketing objectives. Furthermore, the strategies for implementation are formulated within an environment of public-private partnership (PPP). The overarching vision for the next five years is that an implementation body composed of private sector stakeholders will drive the strategy in collaboration with the ministries – primarily, the Ministry of Agriculture and Animal Resources (MINAGRI) and the Ministry of Trade and Industry (MINICOM) – on a number of dairy development issues. Without this strong PPP, there will certainly be a disconnect between production and marketing, both within the GOR as well as between the GOR and the private sector.

A dairy subsector without an NDS would see production of 650,000,000 liters (l), thus creating a surplus of 100,000,000 l of milk in 2017 because of a projected population growth rate of 2.75 percent. The surplus is projected to increase to 200,000,000 l in 2020. It is critical that the market, both informal and formal, absorb and monetize this production in order to drive the economic incentives that can pull the dairy industry to a scale sufficient to make it more cost competitive domestically and regionally. Without market incentives and profitability at the producer level, farmers may cut back on feeding their dairy animals, may choose not to milk their cows (evening milking), or sell their dairy cattle for slaughter because milk cannot be sold. The potential for milk production at scale and the economic promise of the dairy sector will be lost.

The NDS envisions both supply and demand side interventions to realize this promise. While demand for dairy and meat products is projected to increase naturally due to increasing population, urbanization, rising disposable incomes and changes in the demographic structure of the population, the rate of natural demand increase is not likely to be sufficient to absorb the approaching supply bulge. Currently 1/3 of Rwandan consumers consume no dairy products, as identified in the East African Dairy Development (EADD) consumer survey. To create the necessary market pull needed to reach scale, the NDS envisions targeted marketing interventions designed to increase the consumption of milk and milk products from its present level of 40 liters per person per year (l/p/yr) to approximately 80 l/p/yr in 2020, as well as to

reorient consumer demand toward processed, as opposed to raw, dairy production through promotion of its health and hygiene benefits.

On the supply side, the NDS envisions assisting the domestic industry to expand the number of improved dairy cows that are more productive (cross-bred cows) than local Ankole cattle, and cows have to be better fed and managed. Building on GoR's efforts to develop milk collection infrastructure and the cold chain, producers will have to become more market-oriented and commercialized, selling through their milk cooperative. Dairy product diversification (value addition) also will help absorb additional volumes of milk produced. Advertising campaigns for the latter will be required to stimulate consumer interest in what may be new product lines for many Rwandan consumers. As domestic demand and processing volumes grow, milk COP will fall, enabling processors to better tap export markets in countries in the region.

The potential benefits are large if the NDS is properly implemented within a PPP framework. The financial cost of the NDS is an estimated Rwf 15 billion (US\$24.4 million). The cost is spread over five years and three main components: production, marketing, and policy. A small budget is provided for an implementation unit for monitoring and evaluation. Each component has a number of sub-objectives and each sub-objective has a list of activities with a budget, timeline and objectively verifiable indicators (OVI). The size of the total budget is small compared to other recent strategies proposed, such as the Post-Harvest and Handling Strategy (PHHS), with a budget of Rwf 188.8 billion (US\$307 million).

Some activities proposed are within the budgets of MINAGRI and MINICOM so new funds would not always be necessary. Additional investments will be forthcoming as the NDS proves successful. These funds could be from the private sector in plant and equipment and from donors in support of school milk programs and market promotions. Ultimately, these investments (GOR, private sector, and external donors) in the dairy subsector make an important contribution to GDP (currently at approximately 6 percent). With the NDS, dairy's contribution to GDP is projected to increase in 2017 to 8 percent. The following are some of the more important specific interventions envisioned:

1. The GOR will support a vision and strategy for a vibrant and progressive dairy subsector that supports the efficient and safe production, processing and marketing of milk. The Rwanda Agricultural Board (RAB), as the main implementer in terms of funding of the Gir'inka program, will need to take a lead role in development of the dairy subsector.
2. Support the functioning of the Rwanda National Dairy Board (RNDB) as an industry body to create a PPP at both the national and regional levels. The Private Sector Federation (PSF) would play a key role in supporting the development of the RNDB. The RNDB, with the help of the PSF, would create a dynamic, private sector-led dairy forum to address industry needs with government agencies. Topics for public-private dialogue and forums include:
 - a. Access to land for forage and dairy production;
 - b. Land zoned for dairy production;
 - c. Advancement of the "Igikumba Cy'umudugudu" – village kraal model;
 - d. Milk quality industry standards and set up process for certification;
 - e. Enforcement of contracts for delivery of products and services; and,

- f. Government programs on subsidized artificial insemination (AI) and animal health services.
3. Donors will support the GOR's market-driven approach that places priority on meeting the increasing market demand for convenient, quality (hygienic) and affordable milk and milk products, based on market access and targeted to agro-ecological conditions in a milk shed.
 4. The reorganized RNDB could help manage a targeted dairy marketing campaign to increase domestic consumption of milk to keep pace with increased milk produced. The milk campaign will promote both the introduction of milk to the non-consuming segment and increase milk consumption among current consumers by highlighting the nutritional benefits of milk as key messages.
 5. Concurrently on the supply side, support the upcoming Seal of Quality (SoQ) effort, a testing and certification regime at each level of the value chain to be implemented by the Rwanda Agriculture and Livestock Inspection Service (RALIS) and the RAB. Value chain actors that meet standards will be awarded with the right to display the SoQ brand mark, symbolizing their adherence to quality standards. In conjunction, a parallel marketing effort will highlight to consumers the benefits of safe dairy products, driving increased demand for such products. (Summary description of SoQ program in Annex 8.6.)
 6. Support identifying and supplying regional export opportunities, especially in value-added dairy products such as cheese and fermented milk. Burundi and Eastern DRC have been identified as the markets offering highest export potential. Particular attention will be placed on promoting the aspects of safety and quality as unique to Rwanda.
 7. GOR will provide knowledge-based skills to SMEs (individuals, coops, and private firms) to better adopt innovative solutions to filling technological gaps and removing constraints for delivery of inputs for producing, processing and marketing of milk and milk products.
 8. The GOR will support both formal and informal milk channels with the long-term goal of moving actors in milk and dairy value chains from the informal to the formal. Pilot tests will be undertaken to create small businesses and support leadership among women's groups, youth and farmers to enhance the marketing (feed, concentrates, mineral blocks, etc.) and retailing of dairy products in urban areas.
 9. GOR will strengthen existing producer groups and the formation of new market-oriented producer associations/cooperatives and build up the professional capacity of existing primary cooperatives and cooperative unions. Business development services will assist access to credit to provide services in the procurement of inputs, collection of bulk milk, and the sale of dairy products.
 10. For inputs and input services, expand existing services and foster market incentives for new entrants that reward risk-takers who invest their time and resources in new business ventures to provide quality inputs and services to dairy producers and processors:
 - a. Focus on AI and veterinary services relying on the private sector;
 - b. Contracting for services between groups of producers and input suppliers – forage seed, fodder, genetics and animal health;

- c. Development of private rural farm stores linking input suppliers and input services with farmers, coops, and producer groups;
 - d. Availability of micro-credit to support dairy groups and SMEs; and,
 - e. Provision of matching grants, loan guarantees, etc.
11. Expand the proven model of dairy “lead” farmers who will be the catalyst for the testing of innovative “good dairy management practices” which will flow to their contact farmers to adopt improved practices for increased productivity and expansion of dairy herds. This will need to be linked as part of the Gir’inka program with the "Igikumba Cy’umudugudu" village kraal model being promoted for designating a lead farmer for the village shed.
 12. Support the strengthening of public sector research targeted to specific high potential agro-ecological areas for improved dairy production systems and link the results of the research to lead farmers and their contact farmers:
 - a. Forage varietal trials and inter-cropping systems;
 - b. Dairy rations using local agricultural by-products;
 - c. Pasture management and zero grazing systems;
 - d. Nutrient recycling of organic materials for pasture and crop development;
 - e. Production of feed grains and oilseed crops for animal production; and,
 - f. Identify best crossbred animal management systems for different agro-ecological zones.
 13. Roll-out an extension model involving input suppliers, rural farm stores, coops and processors in on-farm demonstrations and training of collectors and members of dairy cooperatives. This can be done with close linkage to the GOR's dairy specialists, sector agro-vets, NGOs, and rural agro-dealers.
 - a. Link “lead” and “contact” farmers to the GOR’s training activities through the sector agro-vet and district dairy specialist.
 - b. Provide technical packages – training manuals (e.g. forage seed production, silage making) – to the lead farmers and their contact farmers in the targeted milk sheds.
 14. Support the training of dairy specialists at the training center at Masaka, V-Tec, and other vocational training centers with technical support in training people for jobs in value-added activities.
 15. Harmonize tax and trade policies (Value Added Tax – VAT, customs, and duties) in line with Common Market for East and Southern Africa (COMESA) and regional trade organizations, and increase the trade in dairy products to Burundi and the DRC. Initiate a policy of VAT holiday for processors on finished products.

The incremental benefits of the NDS are measured in new job creation and increased incomes for dairy farmers. (Other benefits can be calculated, such as improvement in nutrition, but data is more qualitative.)

- The incremental increase in jobs created with the NDS is above the natural increase in jobs by 34,924.

- The economic value of job creation on the national economy is as follows:
 - direct income received by new workers is Rwf 8.43 billion (US\$13.7 million); and,
 - the indirect effect (multiplier is 2 times) is Rwf 16.9 billion (US\$27.4 million).
- Increase in share to producers from the net incremental sales value with the NDS:
 - direct income from sales of additional milk is Rwf 18.55 billion (US\$30.2 million); and,
 - the income multiplier (indirect effect, 2 times) is Rwf 37.1 billion (US\$60.4 million).

The net present value of the flow of net benefits for the first five years of the NDS is an estimated Rwf 4.8 billion (US\$7.8 million). This is based on a conservative estimate of an opportunity cost of capital of 18 percent. The payback period for when the flow of benefit turns positive is at 3.25 years. The internal rate of return on the investment is 47 percent. The indicators point to investments in the NDS for the dairy subsector which are feasible.

1. VISION, MISSION, GOAL AND OBJECTIVES

Dairy production is a pathway out of poverty for many rural households in Rwanda. For this pathway to be sustainable, stakeholders have to be market-driven. Market demand and the forces that drive it (income, population, prices, and cultural factors) influence daily buying/selling decisions at all stages of the dairy value chain. The markets determine the profitability of milk production, processing and marketing and will guide investments in the subsector.

The **VISION** for the Rwanda dairy subsector is to contribute effectively to the growth of the national economy and improve the standard of living for the largest number of Rwandan households in a sustainable and environmentally sound manner. The dairy policy is to contribute directly to achieving Rwanda's Vision 2020's short, medium and long-term goals. The NDS will also contribute to achieving the Millennium Development Goals (MDGs), especially in the areas of food security, gender empowerment, and poverty reduction.

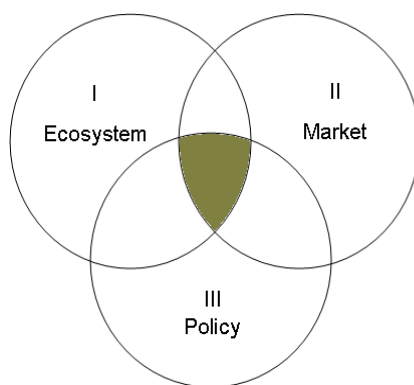
The **MISSION** of the dairy subsector is to create conditions for the provision of wholesome, affordable milk products to benefit the largest numbers of consumers for both the local and regional markets on a sustainable basis.

The **GOAL** is for a competitive dairy sector providing quality dairy products which are affordable, available and accessible to all Rwandans and other consumers in the region. (Dairy Sector Working Group, July 2012)

1.1. Objectives

The NDS has three broad objectives which, when taken together, will achieve maximum benefits to the larger Rwandan society: production/ecosystems, marketing (all activities involving value-added and transformation beyond the farm gate), and policies (institutions, programs, governance). (See Figure 1.1.) The darkened area in the figure, called the nexus, is where all the forces intersect and is the focus of the NDS and its activities. The NDS will be successful if multiplicative benefits of economic efficiency and equity result in the maximization of social welfare benefits to the Rwandan society.

Figure 1.1. Paradigm of an Integrated NDS



1.1.1. Dairy Production/Ecosystems

Dairy production needs to fit within the landscape of land, livestock and people (men and women) of Rwanda. By being part of an integrated system, livestock is both compatible with and supports a healthy ecosystem. With a healthy ecosystem, we can increase livestock productivity (not just more dairy cows, but rather more production and better quality milk per livestock unit). The objective is to improve productivity, increase competitiveness and raise the quality standards of milk at the household level and throughout the value chain.

1.1.2. Dairy Marketing

Dairy marketing objectives include increasing milk consumption, creating consumer awareness of the health benefits of consuming processed (as opposed to locally-pasteurized) milk, and creating increased willingness to pay for processed and value-added products. When realized, increased consumer demand and expanded markets will lead to increased cost competitiveness from economies of scale in production, collection, transport and processing.

1.1.3. Policy Environment and Institutional Framework

A conducive policy environment needs to entice new investments. Regulatory policies support an open and competitive dairy subsector. Necessary as well is an institutional framework which supports business transactions. Ultimately, an efficient and progressive subsector will provide the greatest amount of benefit to all participants in the value chain from producer to the final consumers of milk. Our objective is to strengthen institutions for effective policy support and monitoring to achieve a competitive and sustainable dairy subsector.

1.2. Guiding Principles

The guiding principles of the NDS are to support the national development goals of the country through an integrated systems approach that will:

- Create a platform for a PPP for the dairy subsector that promotes inter-ministerial cooperation, improves business conditions for the private sector, and leads to cost-effective allocation of public resources in support of the dairy subsector based on principles of equity, fairness and gender;
- Guide the GOR in its facilitative role in strengthening the dairy value chain that encourages best business models and practices;
- Build professionalism in all industries in the subsector to improve the performance of all dairy activities undertaken by stakeholders from households to final consumers to encourage transformation to commercial business;
- Recognize smallholders and cooperatives as the preferred business model to reduce poverty, increase incomes and improve food security in rural areas;
- Promote operational efficiencies and reduce transaction costs beyond the farm gate which will lead to improved quality and competitive prices for dairy products for consumers; and,

- Support increased consumption of quality processed milk through an effective integrated SoQ marketing program targeted at different key segments of the population, including current milk consumers, non-consumers and both rural and urban consumers.

The guiding principles of the NDS are consistent with the six pillars of Vision 2020, which are as relevant today as they were in the year 2000:

1. Good Governance – The cooperatives are a cornerstone of rural development, but they have been weakened by governance issues. It will be important to refocus efforts for members to understand how their cooperative needs to be managed and that the membership governs through their board of directors.
2. Transformation of Agriculture – The dairy subsector is a transformative force in agriculture with the opportunity to create high value products for both the domestic and regional markets.
3. Private Sector – Entrepreneurs in the dairy subsector are the leaders who are responsible for growing the subsector. The profitability and competitiveness of the subsector will drive investments.
4. Human Resource Development – As the dairy subsector grows, it will contribute on multiple levels to creating good jobs, developing modern skill sets, and engaging women and youth in these opportunities. Technical education is a keystone to sustainability and competitiveness of the subsector.
5. Infrastructure Development – Because milk is a highly perishable commodity, it has to be collected, transformed and marketed. The backbone in development of the subsector requires roads, electricity, water and research/training institutions to create the opportunity for the value addition in milk. District governments with community participation will have to engage in the rehabilitation and maintenance of feeder roads and other infrastructure.
6. Regional Economic Integration – For the subsector to realize its potential growth, the industries will have to tap regional markets to sell products, generate foreign exchange, and encourage competitiveness.

2. ANALYSIS

The prospects for achieving the target of the NDS to increase consumption of milk and dairy products depend on the current situation. Success is dependent on a number of factors as Rwanda moves towards becoming a middle-income economy in 2020. The analysis is based on a value chain approach using SWOT (strengths, weaknesses, opportunities and threats) analysis. (This section draws upon the expanded analyses found in Annex 8.2. In addition, related issues and context are elaborated upon in Annexes 8.2.a and 8.2.b and a series of preferred policy statements derived in Annex 8.2.c.)

2.1. Current and Projected Scenarios for the Dairy Subsector

2.1.1. Current Situation

Rwanda produces approximately 445,000,000 l/yr of milk with an estimated farm value of Rwf 70 trillion (US\$115.3 million). A number of market participants operate in the milk value chain. The farmers' share

of the final consumer price of milk can be as low as 16 percent compared to countries with modern dairy industries. The cattle inventory is 1.33 million and 28 percent are improved dairy cows producing 82 percent of the milk produced. National productivity is low. The AMS controls the largest percentage of the milk sold beyond the farm gate.

Current consumption of milk is approximately 40 l/person/day (l/p/dy). Overall consumption is not keeping pace with natural expansion in milk production, especially because the outlook is for the growth in demand to remain relatively flat. The reasons are the low purchasing power of consumers relative to the price of milk and the lack of diversity and accessibility to milk products.

2.1.2. Projections to 2017 and 2020 without the NDS

The outlook is for surplus milk to 2017 and beyond based mainly on the number of improved dairy cattle. The national herd is expected to expand to 1.67 million cattle in 2017 and 1.92 million in 2020. Milk production in 2017 could be an estimated 650,000,000 l/yr. A surplus is projected of 100 million liters in 2017. In 2020, the surplus would increase to 200 million liters.

2.1.3. Projections to 2017 and 2020 with the NDS

The goal of the NDS is to double milk consumption to 80 l/p/yr in 2020 matching the goal of Rwanda becoming a middle-income country. Based on population growth estimates, 1,161 million liters of milk will be required in 2020. Milk production will have to increase 13 percent per year to meet this target. At the same time, milk intake by current consumers will have to increase, as well as non-consumers to start drinking milk. A balanced dual-approach to the dairy subsector is needed.

2.2. Production and Productivity Factors

Rwanda has five primary milk sheds and each milk shed has unique characteristics requiring selective interventions on feed, water, breeds and management. Production systems vary by milk sheds and can be either extensive (Nygatare) or intensive (zero grazing in Gibumbi and Kigali). Highest production costs are in the intensive systems because of additional labor and feed costs. Based on field surveys, the return on capital invested in dairy production ranged from 16 percent in Gishwati to over 30 percent in Nygatare. Farm-gate milk prices vary between wet and dry seasons because of supply. An opportunity to smooth-out the milk sales to avoid the selling of most milk in the low price season would benefit farmers.

2.2.1. Natural Resources

Rwanda is one of the most densely populated countries with an average of 444 persons per square kilometer, and average farm size is less than .5 ha per household. Balancing dairy production with land availability has to be a key part of the NDS. Marginal and hillside lands in crops in GOR's Crop Intensification Program (CIP) would be better suited for forage production.

2.2.2. Animal Health

Animal health supplies and equipment are in adequate supply, and the GOR does not provide direct subsidies to producers to purchase these items. Over 1,000 agro-vet shops operate throughout the country which opens access to dairy producers for inputs. What is limiting is the lack of service providers with adequate knowledge and transportation to support dairy producers. (A high incidence of mastitis affects

dairy productivity.) There is a shortage of practicing veterinarians (only 11 veterinarians out of 90 are in private practice), and there is a shortage of trained para-vets to work with producers. GOR's sector vets have to care for 3,150 cattle, on average. Training and education institutes will have to be upgraded and expanded to meet the deficit in trained specialists which fits within the Vision 2020 plan.

2.2.3. Breeding and Genetics

The dairy subsector requires a clear GOR policy on an array of issues dealing with the future genetic profile for Rwanda's dairy herd. The GOR's bull station, the quality of the semen and the delivery services are in need of review if the goal for production in 2020 is to be realized. GOR's subsidy for semen keeps the price low for farmers; however, the performance of the program is not advancing the industry. Privatization of the AI service, removal of the subsidy and greater reliance on imported semen may be a better alternative for the GOR. A benefit-cost analysis may show that purchasing proven, quality semen internationally will be more effective in improving the genetics of the national herd. Attaching private AI inseminators to a milk chilling center (MCC) may be a method to improve outreach to producers.

A fundamental weakness with breed and genetic improvements is the lack of an identifier system for dairy cattle. Herd records and bull performance measure by progeny testing would improve successive generations of dairy cows. Sustained genetic improvements will not occur using locally bred dairy bulls with these tracking programs. Complementary work with the Gir'inka program could improve cow identification, as well as cooperation with the MCC system as first points of contact with dairy farmers.

2.2.4. Feeds and Feeding

The main constraint to increasing milk production is feed and feeding practices. The CIP program utilizes most of the high quality crop production areas, constraining the production of quality forages. (The exception would be the Gishwati area in the Northwest milk shed.) Furthermore, producers lack the modern techniques to conserve forage in the dry season and profitably prepare feed rations for crossbred and purebred dairy cows. Producers need to increase their production of quality forages and use of alternative feeds including hay, silage, crop by-products, agro-industrial by-products and concentrates in the feed mix. Private suppliers of forage seeds and hay are attractive business opportunities important in the commercialization of the dairy industry, and producers with access to land could benefit from this activity. Rwanda lacks a national animal feed policy, and feeding strategies need to vary by the milk shed to include the evaluation of the CIP program and other good rotational grazing management systems.

Feed concentrate is important in a modern dairy subsector, as well as supporting other livestock enterprises. Concentrate feed costs around Rwf 160 to 190/kg and for most of the year milk prices do not justify the cost of using concentrate feed. With oilseed and cassava processing plants coming online within the next year, these factories may help to lower the cost of feed ingredients. A national animal feed policy needs to examine the investment in these facilities and other processing and mixing plants planned in the future. There is a private sector feed industry emerging, and dialogue needs to occur on the best pathway for growing the private industry. A study of the feed industry in Rwanda is recommended.

2.2.5. Access to Finance

Smallholder dairy enterprises offer a steady source of cash flow for rural households. It is important to identify those dairy producers that are creditworthy. In a recent study, 43 percent of dairy farmers were

found to be creditworthy, which is positive for reaching the NDS production goal set for 2020. Creditworthy producers tend to be those who can hold down investment costs in fixed assets, keep production costs per liter of milk low, and sell both morning and evening milk. Financial lenders – micro-finance institutions (MFIs), savings and credit cooperatives (SACCOs) and banks – need skills to identify worthy producers, train loan specialists, and conduct appraisals. The opportunity exists for special lending programs that adopt structured trade financing strategies so that repayment of the loan is recovered through deductions from milk sales, as is practiced in Kenya, South Africa and Uganda. This repayment program will minimize borrowers' default risk. Once finance is flowing, the increased milk supply can create other opportunities for commercial processors and wholesalers to access financing based on economic volumes of throughput. At that point, commercial lenders can be assisted to develop strategies and products to finance these larger investments.

2.2.6. Extension

Dairy producers lack information on modern dairy practices within a "whole farm business" approach. This includes improving cow husbandry, nutrition and feed sources, animal health and genetics. Extension is a critical constraint to attaining higher targets of milk through increased productivity of dairy cows. GOR carries out agricultural extension with its funds or with assistance from donors like the International Fund for Agricultural Development (IFAD) and NGO projects (RDCP, EADD and IFAD-supported KWAMP and PAPSTA) implemented by NGO staff or the GOR contracting local staff. There are currently six dairy specialists, and one agro-vet in each sector (416 in total), but they are constrained by lack of mobility and dairy knowledge to service an expanding dairy industry that is becoming more sophisticated. The RAB has identified MCCs through the MCC Hub project for transfer of knowledge, but this program will stretch its existing resources to service the planned number of MCCs. More field dairy specialists will result in increased productivity.

2.2.7. Infrastructure

Roads, water and electricity are important to obtaining the cost efficiencies required for the development of the dairy subsector. Producers without good road access receive the lowest average cost per liter of milk. A dairy cow requires large volumes of clean water daily (a cow producing 10 – 12 l/day needs 40 to 50 l of water per day). Water development within MINAGRI's Livestock Infrastructure Support Project (LISP) and road construction within MININFRA are important to subsector development. At present only 14 percent of poor and rural households have access to electricity. The MININFRA strategy calls for greater efforts to expand access to electricity into rural areas, and it includes the development of biogas from cattle for rural households. This fits with the NDS to expand the opportunities for biogas production. Solar power is another option, especially for MCCs to heat water, and the conversion of diesel engines to operate on bio-fuels produced in Rwanda.

2.3. Milk Collection and Distribution

Efficient collection of milk is a critical and indispensable link between producers and processors if the dairy subsector is going to be competitive in the region. The AMS takes upward of 75% of all the milk marketed (350,000 l/yr) with only a small share taken by the MCCs selling to processors. This partly explains why MCCs are currently at a low level of profitability. There are 61 MCCs, and several are not functioning. MCCs have a higher fixed cost structure than the AMS operators, which makes it harder to

be profitable unless utilization rates are high. The location, size and operation of MCCs have to be designed to the needs of producers to rapidly collect their milk (morning and evening) and convey it to bulk chilling for transporting to processors. The MCC-processor channel has the potential to expand and to maintain the quality of milk necessary for further processing.

The strength of the MCC is in acting as a cooperative to assist smallholder producers with an array of services that are not provided by the AMS. The weakness is that MCCs are not managed effectively for a number of reasons. Management of the MCC can be poor with minimal oversight, and trainings are needed to upgrade the skills for directors, staff and producers. MCCs can serve as a business hub for delivery of services, once the core business of collecting, chilling and selling milk is profitable.

2.4. Milk Processing

There are approximately 25 processing factories country-wide with a total processing capacity of 160,000 liters per day. Only 15 to 20 percent of this capacity is being utilized. For Rwandan processors to begin to utilize this additional capacity, they must undertake changes in quality, price and product diversification.

The processing cost of pasteurized package milk is over 50 percent of the retail price. With increased milk production through MCCs and improved quality (lower rejection rate), processing costs will be reduced by as much as 20 percent. To reach the milk target set for 2020, the milk processing industry will need to utilize its established capacity and new plants will need to open. The plant in Mukamira in the Northwest will be an important addition for processing milk from the Gishwati region. Processing plants will need to expand their equipment to introduce new products and package types. Local manufacturing companies can develop packaging materials that can help to reduce the final retail price to consumers.

The majority of processors are producing identical products. Manufacturers need investments in new equipment and training in product development and standard sanitary operating procedures (SSOPs). This will allow for the development of more specialized dairy products. The processing industry needs to absorb surplus volumes of milk and convert into shelf stable products. Powdered milk plants give the option of being able to store and reconstitute powder at a later date when raw milk is not abundant or pack in suitable packs (either bulk bagged or canned) and sold as an export product into the DRC. Given the large surplus of raw milk projected for the coming years, it would make more sense to look into an operation that could eventually incorporate two drying facilities each with a capacity of approximately 150,000 liters per day (approximately 15 tons of powder each). The approximate cost of setting up a green field milk powder plant with a capacity of 40,000 liters per day could be upwards of US\$1.5 million.

2.5. Distribution and Marketing

2.5.1. Domestic

The main consumer outlets in urban markets for milk are milk bars and retail stores. The opportunity exists to improve the hygiene of milk in milk bars for a large number of consumers and improve the image of milk in general to increase consumption. Promotion of certified safe milk and the benefits of its consumption should be highlighted as a key new intervention, highlighting the risks of consumption of the non-traceable AMS product. Domestic processors face the threat from imported processed milk from more competitive producers in the region. Ultra-heat treatment (UHT) milk is the most common product

sold throughout the Central Lakes Region, and currently Inyange, the only processor, is not price competitive.

2.5.2. Regional Exports

A study of the regional markets found an untapped potential exists for dairy products from Rwanda. The regional population is over 150 million people and the middle class segment is growing with greater amounts of discretionary income. High rates of urbanization are enlarging the middle class who will purchase dairy products. The market research focused on five key urban areas of Bujumbura, Bukavu, Goma, Kampala, and Mwanza. These urban centers have middle class consumers who could purchase Rwandan dairy products over the next five years.

The two markets offering immediate opportunities are Burundi and the DRC. The opportunity exists to promote branded Rwandan dairy products in the Uganda market because they are cost competitive and there is the perception that Rwandan products are high quality. The latter perception can be reinforced through implementation of the quality and testing aspects of the SoQ program, coupled with marketing efforts to promote the SoQ.

The target for Rwandan milk exports is to reach US\$18 to \$20 million per year by 2017. Initially, the emphasis would be mainly on low-cost packaged milk products and value-added products. Private sector processors and cheese makers could develop suitable products and packaging sizes for Burundi and DRC. A shelf-stable yoghurt offers attractive market opportunities. Polybags, not permitted for sale in Rwanda, could be targeted exclusively for the export market, and they would be one-tenth of the price of currently imported expensive packaging. Two other packaging types to explore are Ecolocan and Ecilester. Additional trade investigations to Burundi and DRC are necessary to develop trade links to distributors.

2.6. Policies

A conducive policy environment will be important to reach the targets set out in the NDS. As rural wages increase and the cost of land (value) increases, there will be pressure to increase herd size and scale-up operations. Currently, the GOR lacks a clear policy on the dairy subsector to address these issues. The Gir'inka program is the cornerstone for the GOR for dairy, but it is time to transition to having a complete subsector approach rather than a narrow focus on cows for poverty alleviation to include initiatives beyond the farm gate. GOR's investment policy in infrastructure will need to include roads, water, electricity and training and research institutions that benefit specifically the dairy subsector. To achieve this, government budgetary support to livestock needs to approach 30 percent of the agricultural budget, which itself needs to be at least 10 percent of the annual GOR budget. The GOR will need to provide incentives to entice private sector investments in input supply, milk production, transportation, processing and marketing of dairy products. Incentives can include tax holidays for new investors or waivers on the VAT to allow competition with the AMS. The promotion of an SoQ throughout the dairy value chain would elevate the stakeholders to improve quality from the farm to the final consumer. The Rwanda National Dairy Board (RNDB) exists, but it is not able to advocate for the necessary changes in policies required to meet the challenges facing the subsector if the country is to reach the target of 80 l/p milk consumption in 2020 as envisioned in the NDS.

2.7. Conclusions from the Analysis

The analysis leads to several conclusions in key areas.

2.7.1. Production and Productivity

Four priority areas are as follows:

1. Extension program to convey the necessary information to producers through lead farmers and cooperatives, agro-vets, and sector vets. Farmer championed initiatives have been proven to be successful and sustainable for farmer-based education programs – farmer field school (FFS) or some type of farmer structured and led activity.
2. Appropriate research programs on forage production systems, genetics and cattle nutrition, and linked to the extension program in no. 1 above.
3. Reduction in production costs through the promotion of a holistic management program including the expansion of the village kraal program.
4. Utilization of existing vocational and university institutions to train dairy specialists and others to enter the dairy subsector (V-Tec and university certification programs in animal husbandry and health).

2.7.2. Value Addition and Marketing

The top priority areas are the following:

1. Develop and test an alternative milk collection system that reduces the capital costs and introduces more scalable satellite centers, appropriate transport and bulk chilling and tankers.
2. Infrastructure investment by the GOR, districts and donor partners in roads, electricity and water.
3. Expand training center at Masaka to serve as a center for new product development for cheese, yogurt and other processed products.
4. A national campaign to increase consumption of milk and dairy products. The campaign should target various segments of the Rwandan population. Key goals will be increased consumption of milk by existing consumers and consumption of milk by those who are currently not consuming any dairy products. Inter-ministerial collaboration will help ensure campaign effectiveness, especially when targeting segments such as children and new consumers. (See Annex 8.6 for the SoQ concept, which will be introduced during 2013 by the USAID-funded RDCP-II project.) It is intended to scale up this initiative from pilot into a national program with key collaborating GoR partners.

2.7.3. Policy Development

The following are the top priorities:

1. Establish a sustainable public-private partnership for leading the dairy subsector.
2. Restructure the RNDB to serve as a catalyst for driving the necessary changes and helping identify processes for expansion of sales in both Rwanda and neighboring countries.

3. Initiate a dairy export strategy to expand cross-border sales of value-added dairy products. This could be managed by a functional RNDB in collaboration with the Rwanda Development Board (RDB) and/or MINICOM.
4. Develop within the Ministry of Education (MINEDUC) and the Ministry of Health (MINISANTE) a comprehensive dairy nutrition education targeting women and children about the importance of dairy in their diet.

3. DAIRY SUBSECTOR STRATEGIC PLAN

The NDS is an ambitious effort to transform the dairy subsector into a set of market-driven industries. The strategy is composed of four components (#1: milk production, productivity, quality and standards; #2: milk collection, processing, consumption and trade; #3: policy interventions that improve production, processing, consumption and trade; and, #4: implementation and coordination of the NDS) that support segments along the dairy value chain. (Annex Figure 8.4.6.1.) The components, when taken together, create multiplicative benefits for the stakeholders and the general economy.

Each component has a primary objective with a set of milestones (see Table 3.1.). The global milestone for each component is measurable to determine the status of reaching the objective for the component. Each component's objective has a number of sub-objectives with activities and with output indicators. Each activity identifies which ministry, agency or the private sector would have primary responsibility for implementation. (See Annex Table 8.3.10.2. for the list of activities by component/objective and sub-objective.)

3.1. Component 1. Milk Production, Productivity, Quality and Standards

Currently, milk production is approximately 450,000,000 l in 2012. The objective for component 1 is to increase production of milk to 810,000,000 l in 2017 to keep pace with population growth and to be on track to reach 80 l/p/yr in 2020. The milestones for this objective are the following: 2.2 million l/d of milk is entering the commercial system; all MCCs are profitable and fully operational at 100 percent of their installed cooler capacity; over 70,000 new jobs created; and, income of dairy households in the Gir'inka program increases by 20 percent over the baseline. MINAGRI is the lead ministry and the Rwanda Bureau of Standards (RBS) and the Rwanda Agriculture and Livestock Inspection Service (RALIS) assist on improving the quality standards of milk. The budget is Rwf 4.93 billion (US\$ 8.02 million).

3.1.1. Sub-Objective (SO) 1.1. Lead Farmers (LF) & Group Kraal, Activities 1.1.1. - 1.1.7.

To increase production, the focus is on developing strong groups of dairy farmers and reducing their costs of production through economies of scale. The target is for a total of 750 lead farmers (LF) with each LF having 10 followers. The village "kraal" program can improve the Gir'inka program by increasing the rate of technology/management adoption by smaller producers. The village kraal program will be expanded based on results from pilot tests (Activity 1.1.3 and 1.1.4). Each kraal will have 20 households sharing a common shed and receiving public and private services, e.g. health care, AI and water. USAID through its projects and implementing partners will support piloting the kraal approach. The kraal program can also benefit from a program to install 5,000 biogas units as part of the National Domestic Biogas Program

(NDBP) supported by SNV and MININFRA. **The main actors are:** MINAGRI, RAB, districts and private sector agro-vets. The budget is Rwf 3.487 billion (US\$5.670 million).

3.1.2. SO 1.2. Input Supply - Advisory Services, Activities 1.2.1. - 1.2.3.

This sub-objective (SO) targets the input delivery system so that dairy producers have access to necessary inputs from suppliers in their district. The indicators of improvement are the number of transactions by producers and the value of inputs used in the dairy operation. **The main actors are:** RAB, RDB and districts. The budget is Rwf 332.1 million (US\$540,000).

3.1.3. SO 1.3. Seed Multiplication & Forage and Hay Businesses, Activities 1.3.1. - 1.3.6.

The strategy addresses the need for new small businesses to be started in seed production, forage cultivation and sales. The new businesses can be targeted to existing dairy farmers who have the land rights to use the land for forage production. Included in the activities is building feed mixing businesses to support the dairy producers. At least 30 percent of the new businesses will be women owned. A national feed supply study will be done in the first year at a cost of Rwf 36.9 million (US\$60,000). The output is to establish a commercial feed supply. **The main actors are:** RAB, RDB and districts. The budget for this SO is Rwf 587.4 million (US\$955,200).

3.1.4. SO 1.4. Increase Milk Production on Medium to Large Farms, Activities 1.4.1. - 1.4.4

The purpose is to improve the farm management of commercial dairy operations. The training will be targeted to farm managers who are employed by absentee owners. Men and women will be targeted as recipients of this program. We would expect that production will increase by at least 25 percent over the baseline for these commercial farms. **The main actors are:** MINAGRI, RAB, MINERENA, and WDC. The budget is Rwf 255.8 million (\$416,000).

3.1.5. SO 1.5. Access to Finance Linking to Milk Sales Revenues, Activities 1.5.1. - 1.5.4.

Dairy producers can access financing through a mechanism of structured contracts using milk checks as collateral and payment to financial institutions. The indicators of success are that farmers have accessed loans, established bank accounts to receive payment of their milk checks, and pay off their loans. **The main actors are:** MINAGRI, RAB, BRD Development Fund (BDF), Banks, MFIs, and SACCOs. The budget is Rwf 119.9 million (US\$195,000).

3.1.6. SO 1.6. Train Dairy Extension Specialists for Districts, Activities 1.6.1. - 1.6.2.

There are 416 sector agro-vets, but they lack the skill sets, time and resources to carry out their functions. Thirty (30) dairy specialists would be trained and posted to the districts to conduct producer programs, and better train and supervise sector vets in dairy programs. The dairy specialist can also work with private agro-vets and supplier dealers. The dairy district vet will be responsible for overseeing the development of the LF groups and village kraal program. The objective is for district dairy specialists, with the help of sector vets and private agro-vets, to train 10,000 dairy producers by the end of the fifth year. **The main actors are:** MINAGRI, RAB, RNDB, and districts. The budget for this SO is Rwf 150.7 million (US\$245,000).

Table 3.1. NDS Simplified Logframe

Overall Goal		OVI	MOVI	Risks and Assumptions
To reduce food insecurity through an efficient post-harvest, private sector system delivering milk and dairy products to the people of Rwanda		MDG Targets 1, 4 and 5 being met by changes in income, diet and livelihoods	Government Reports on State of the Nation, Economic Reports, UN Reports	Government Reports on State of the Nation, Economic Reports, UN Reports
Component 1. Improving Milk Production, Productivity, Quality and Standards		OVI	MOVI	Risks and Assumptions
	Objective: Improved production and supply channels, quality and standards of milk produced at household, smallholder and commercial producer levels	100% of installed cooling capacity is supplied by yr 5; 2.4 million l/day, employment = 88,000 new jobs; producer income from livestock increases by 20% of the baseline for 350,000 households in 2017	Annual Reports from MINAGRI, RBS and businesses; Monitoring and Evaluation verification reports	Continued support for dairy by national and international stakeholders; Producers and consumers respond to support measures; Information is freely available
	1.1	Lead/Model farmer system development	Records of Groups Names; Monitoring Reports	Lead Farmers continue to support farmer groups.
	1.2	Input Supply and Advisory Services small-scale dairy operations	Records of sales; Monitoring Reports	Suppliers see the benefit of improved linkages
	1.3	Business diversification and income generation for both men and women in seed multiplication and forage production	Business records and registration; Monitoring Reports	Suitable land is identified for improved forage production supporting businesses
	1.4	Increase milk production in high potential areas for commercial size farmers	Milk production and sales records; Monitoring Reports	Consumer demand rises in the period of the Strategy
	1.5	Improve access to finance and formal payment systems for the development of the dairy sector	Loan records; Monitoring Reports	Records are accurate
Component 2. Milk Collection, Processing, Trade and Consumption	1.6	Livestock Extension Advisory Services	Records of contact sessions by extension workers; Monitoring Reports	Critical number of applicants interested and able to participate
		Objective: Improved milk collection, processing efficiencies and product distribution to reduce costs and increase benefits from economies of scale leading to greater uptake and competitiveness	MINAGRI statistics on production and employment and MCCs; Monitoring Reports	Processing efficiencies take longer to introduce; individuals move into other sectors; Information is freely available
	2.1	Improved efficiency and reduced losses in the collection of milk	MINAGRI statistics on production and MCCs and MCCs records; Monitoring Reports	Consumers take longer to increase their demand and increased production cannot be sold
	2.2	MCCs become major consolidation points for formal and AMS sectors	MCC records on utilization; Monitoring Reports	Utilization rates are not met
	2.3	Increased proportion of milk processed for sale	MCC records on utilization; Monitoring Reports	Utilization rates are not met and demand remains low
	2.4	Product Diversification and Packaging	Package descriptions and packages themselves; Monitoring Reports	Alternative packaging remains costly
	2.5	Increased cheese production and sales	Cheese production records accepted; sales records of processors; Monitoring Reports	There may be technical difficulties in getting increased production levels up and consumer demand may remain low
	2.6	Increased sales of affordable dairy products	Training program records and attendance certificates issued; Monitoring reports	Not sufficient critical mass of interested people participating in the sessions and therefore certified

Component 3. Policies, Interventions that improve production, processing and marketing	Objective: Institutional strengthening for policy support to achieve a competitive and sustainable dairy subsector	ca. 10% of agricultural budget is dairy sector development and ca. 30% to livestock	Government budgets; private sector investment reports; Monitoring Reports	Other priorities are identified
Sub-Objective:	3.1 Productivity and Animal Health	Increase milk per animal by 25% by end of yr 4	MINAGRI statistics; Monitoring Reports	Animals are well managed
Sub-Objective:	3.2 Policy review to improve logistics and road network for collecting milk in rural areas	At least 200 km of roads to MCCs	Road reports and completion documents; Monitoring Reports	No unforeseen issues with data collection or road construction
Sub-Objective:	3.3 Improve electrical access to dairy producers and MCCs	x Number of MCCs connected by 2015	Connection confirmation through MCCs records; Monitoring Reports	No unforeseen issues with MCC connections
Sub-Objective:	3.4 Market Research to expand outlets both domestic and regional for milk through the formal milk channels	Formal milk sales increased by 10% by year 3	MINAGRI statistics; Monitoring Reports	Difficulties getting accurate statistics
Sub-Objective:	3.5 Build Capacity Program for enhancing skills in the dairy sector	Increase the number of graduated dairy specialists and technicians by 10% each yr	Graduation lists; Monitoring Reports	Not sufficient critical mass of interested people participating in the sessions
Sub-Objective:	3.6 Improve the business environment conducive for the development of dairy sector	Private sector investment increases by x billion Rwf per year in dairy activities above the figure in 2012	Private sector investment statistics; Monitoring Reports	Private sector may see greater opportunities in other sectors
Sub-Objective:	3.7 Promote safe, wholesome dairy products that meet both domestic and foreign market standards and demand	Study completed by end of year 1 and then tabled at the public-private platform in mid-year 2	Study; Monitoring Reports	Delays getting study underway
Sub-Objective:	3.8 Increasing domestic milk consumption through public awareness campaigns and national emphasis on milk quality certification and safety	Per capita consumption of milk doubles to 80 l/p/yr	MINAGRI/ National Statistics Unit; Monitoring Reports	Statistics will need to be representative and freely available
Sub-Objective:	3.9 Increased volumes of Rwandan dairy products sold within the region through emphasis on branding, quality, value addition and targeted trade missions	Regional exports increase	Minicom cross border records	Private sector will need to invest resources in exploring regional opportunities
Sub-Objective:	3. 10 Establishment of Public-Private Platform to Harmonize Dairy Sector Competitiveness and Guide Investment	Two policies passed by GOR by yr 3; and private investors plan x billion Rwf in dairy sector beginning Yr 4	Policy Document produced; Monitoring Reports	Policy may take longer to debate/delays
Component 4. Implementation and Coordination	Objective: Efficient oversight of NDS implementation and coordination of activities and investments leading to greater competitiveness and management of the sector	Established and fully operational NDS Unit	External Annual Performance Assessment	Complementary investments may not be needed to deliver the strategy
Sub-Objective:	4.1 Implementation and Operating costs of Implementation including M&E activities	Established and fully operational NDS Unit	External Annual Performance Assessment	Complementary investments may not be needed to deliver the strategy

3.2. Component 2. Milk Collection, Processing, Trade and Consumption

The objective is to improve milk collection so as to have better quality of milk, which will increase processing efficiencies and reduce costs because of greater economies of scale. Processors will be able to purchase a greater volume of milk and be more competitive. **The main actors are:** MINICOM, which will have a lead role in many SOs with the support of MINAGRI. The budget for this component is Rwf 3.9 billion (US\$6.34 million).

3.2.1. SO 2.1. Improve Efficiencies in Milk Collection, Activities 2.1.1. - 2.1.3.

A first step will be to conduct a study on the feasible solutions to collect the largest quantities of milk in each of the main milk sheds. This can be done by the RDCP-II project with the help of a local consultant. Training and pilot tests will be conducted on best practices to collect milk by traders and the MCCs. **The main actors are:** MINAGRI, LISP, and LOL's RDCP-II. Budget is Rwf 311.3 million (US\$506,000).

3.2.2. SO 2.2. MCCs become Consolidation Points for all Raw Milk, Activities 2.2.1. - 2.2.5.

All MCCs will be functioning and profitable through a number of initiatives and training programs. MCCs will operate at the installed capacity of their coolers. A few MCCs will pasteurize and cool milk for bulk sales to schools in the area and to Community Health Clinics in their sector. **The main actors are:** MINICOM and RAB will take the lead in this activity. MINEDUC will assist with the school feeding program, and MINISANTE with the Community Health Clinics. The budget is expected to be Rwf 3.088 billion (US \$5.021 million).

3.2.3. SO 2.3. Increase the Utilization of Plants' Capacity, Activities 2.3.1. - 2.3.3.

More milk will go through the formal sector by an increase over the baseline of 75 percent. Training and equipment upgrades will be bank financed for milk and cheese processors. **The main actors are:** MINICOM, RBS, RDB, and private processing plants. The budget is estimated at Rwf 104.6 million (US\$170,000).

3.2.4. SO 2.4. Diversification of Product Lines to Increase Sales, Activities 2.4.1. - 2.4.5.

Product variety is the focus of this SO and engages processing and marketing to have an effective program for outreach to processors and cheese makers. Processors will broaden their product lines. The activities will increase the capacity of processors to utilize equipment to bring new products to the market. Increasing the array of value-added products is a key means of absorbing additional volumes of milk produced. Knowledge of consumption preferences is important to ensure appropriate diversification is pursued. Assistance to commercial lenders is needed for them to better understand and finance creditworthy borrowers. Processors will be assisted in access to finance for product development. **The main actors are:** MINICOM, RBS, Banque Rwandaise de Developpement (BRD), and BDF. The budget is Rwf 227.5 million (US\$ 370,000).

3.2.5. SO 2.5. Increase Cheese Production and Sales, Activities 2.5.1. - 2.5.2.

A coordinated approach is required to upgrade the technical skills in the cheese-making sector. The opportunity exists to professionalize cheese-making based on promoting best production practices to provide more consistent and superior cheese products. Cheese makers will receive training in better

processing methods to improve the quality and diversity of products, not just the standard gouda cheese. Cheese plants can take advantage of financial packages from lenders to improve their operations. **The main actors are:** MINICOM with involvement from RBS, RDB and financial institutions such as Bank Populaire Rwanda (BPR) and BDF. The budget is Rwf 98.4 million (US\$160,000).

3.2.6. SO 2.6. Increased Sales of Safe Dairy Products, Activities 2.6.1. - 2.6.2.

Professionalizing milk-handling activities, coupled with enforcement of milk-handling requirements based on a certification system, will assist in promoting the benefits of consuming safer dairy products. The activities are directed at wholesalers and retailers of milk on the proper handling and promotion of milk products. The activities include working with milk bar operators and dairy companies on ways to increase consumers' access to pasteurized milk. Milk bars that participate in training would be certified and receive a plaque to display in their establishment. **The main actors are:** MINAGRI, RALIS, RNDB, RBS and the Rwanda Milk Sellers Association (RMSA). The budget estimate is Rwf 71.586 million (US\$116,000).

3.3. Component 3. Policies, Institutions and Interventions to Improve Dairy Subsector

As a policy-driven component, a milestone is for over 10 percent of the national budget to be allocated to agriculture and, of this amount, 30 percent to be allocated to the livestock subsector of which dairy would receive 50 percent. Interventions are systems based on creating synergies in production and marketing. **The main actors are:** MINAGRI, MINICOM and RNDB. The budget is Rwf 4.095 billion (US\$6.66 million).

3.3.1. SO 3.1. Livestock Productivity Improved, Activities 3.1.1. - 3.1.4.

Activities include studies to examine the cost-benefits of certain interventions such as the importation of semen versus a bull station at Masaka. The activities will result in average milk production increasing 75 percent by the end of year four for 10,000 dairy households. Activities address feeding systems, reproduction evaluations, and animal health delivery services. **The main actors are:** MINAGRI would be the lead ministry and will work with MINICOM and RDB. The budget is Rwf 159.9 million (US\$260,000).

3.3.2. SO 3.2. Enhance Planning of Feeder Roads for Milk Collection, Activity 3.2.1.

MCCs and communities are to be part of the decision process for selecting feeder roads to be constructed or rehabilitated. A study is planned on the current and planned MCCs and the demand for road access. After GIS mapping of dairy-related facilities, the results will be presented to the relevant district administrative unit for roads. (See maps in Annex Figures 8.4.4.10. - 11.) **The main actors are:** MININFRA, MINAGRI, MINALOC, and districts along with donor agencies. Budget estimate is Rwf 30.75 million (US\$50,000).

3.3.3. SO 3.3. Improve Access to Electricity for Dairy Producers and MCCs, Activity 3.3.1.

This activity will examine ways to improve sources of electricity to dairy producers, village kraals and MCCs to reduce costs of operations. The activity will include pilot tests of alternative energy sources, such as wind, solar and biogas. **The main actors are:** MININFRA, districts, EWSA, and MINAGRI to plan for providing reliable electricity to dairy units. The budget is Rwf 30.75 million (US\$50,000).

3.3.4. SO 3.4. Market Research to Expand the Markets for Milk, Activities 3.4.1. - 3.4.3.

Activities will include market appraisals and trade missions to Burundi, the DRC and other countries to increase sales of Rwandan dairy products. A concrete export market-led approach for specific products should be developed based on knowledge of potential opportunities in these neighbouring markets. The project will link to E-Soko, and the use of market prices will be conducted by MINAGRI. **The main actors are:** MINICOM as lead ministry with the involvement of RNDB, RDB, and the National Agricultural Export Board (NAEB). The budget is Rwf 455.1 million (US\$740,000).

3.3.5. SO 3.5. Build Capacity with Skills in the Dairy Subsector, Activities 3.5.1. - 3.5.2.

Technical skills in dairy need to be improved through training programs. **The main actors are:** MINICOM, MINAGRI, WDA, and RNDB, as well as T-VET and Masaka Training Center. The budget estimate is Rwf 332.1 million (US\$540,000).

3.3.6. SO 3.6. Create Business Environment Conducive for Dairy, Activities 3.6.1. - 3.6.5.

Stimulate private investment in the dairy subsector by introducing financial packages, business feasibility studies, tax policies to defray investor costs, and public sector promotion. Financial institutions will set up specialized lending to investors in the dairy subsector. Access to investment capital, in most cases, will be much simpler if working capital can easily be met by Rwanda's banks. **The main actors are:** MINICOM, as well as financial institutions lending to prospective investors. The budget for this SO is Rwf 289.05 million (US\$470,000).

3.3.7. SO 3.7. Safe Dairy Products for Domestic and Regional Markets, Activities 3.7.1. - 3.

This set of activities will address safe handling of milk along the value chain. This approach is essential if Rwanda is to pursue the goal of increasing regional market share. Trained technicians will be needed along the value chain to train, inspect, audit and certify that a quality milk chain exists. The Food Safety Manual will be updated for dairy products in line with COMESA standards. A plan to meet these standards can be done in forums and training sessions. The goal is for household food expenditures on dairy products to increase by 50 percent over the available baseline level. **The main actors are:** RBS, MINICOM, MINAGRI, RNDB, RAB, RALIS and private dairy businesses. The budget is Rwf 694.95 million (US\$1.13 million).

3.3.8. SO 3.8. Promotion Program on Increasing Milk Consumption. Activities 3.8.1. - 3.8.3.

A main pillar of the dairy strategy is to increase the awareness among the general population of the benefits of consuming dairy products. A nationally coordinated campaign will be targeted at different segments of the population identified in the EADD Dairy Market Research. A campaign of this nature will require inter-ministerial collaboration, in particular MINAGRI, MINISANTE, and MINEDUC to ensure a consistent message and approach towards increasing consumption. The RNDB will take leadership in the awareness program. The school milk program will be expanded to include more schools and students for the next five years. MINAGRI and MINEDUC will be active on the school program, and MINISANTE will take the lead on the health and nutrition activities. **The main actors are:** RNDB, MINAGRI, MINEDUC, and MINISANTE. The budget is Rwf 1.9 billion (US\$3,090,000).

3.3.9. SO 3.9. Increasing Regional Exports of Milk and Dairy Products

Increasing volumes of Rwandan dairy products sold within the region through emphasis on branding, quality, value addition, product diversification, and targeted trade missions. **The main actors are:** MINICOM, RNDB, RDB, RBS, and the private sector.

3.3.10. SO 3.10. Public-Private Partnership (PPP) for Dairy Subsector

These activities will establish and promote a platform for public-private stakeholders (e.g. associations) to plan and carry out the NDS for the next five years. The platform will be used to convene forums (link to studies conducted under 3.2.1., 3.4.1., 3.4.3., 3.6.4., and 3.7.3.) and establish a database of stakeholders/institutions/NGOs in the dairy sector. **The main actors are:** MINAGRI, MINICOM, RAB, PSF, RNDB, RBS, banks, and private sector representatives. The budget is Rwf 264.5 million (US\$430,000).

3.4. Component 4. Implementation and Coordination of the NDS

Implementation of the NDS is important. The three components require constant attention to roll out activities in a timely manner. Only with constant monitoring will the NDS yield the expected results envisioned for the dairy subsector over the next five years. The RNDB is the key organization leading this component. **The main actors are:** MINAGRI and MINICOM to have oversight for restructuring and guiding the RNDB. These ministries with their respective agencies will monitor the progress of the NDS. The estimated budget for this component is Rwf 2.002 Billion (US\$3.26 million).

3.4.1. SO 4.1. Effective Implementation and Monitoring of the NDS

The activities include the formation of the public-private partnership, review of the by-laws and the legislation to form the RNDB, and management oversight and monitoring. **The main actors are:** MINAGRI as the lead agency with MINICOM in a supporting role with their respective agencies and the RNDB. The budget for this SO is estimated at Rwf 2.0001 billion (US\$3.255 million).

4. STAKEHOLDERS' ROLES IN IMPLEMENTATION

The development of the NDS was the effort of individuals from both the public and private sectors. Meetings were held with groups and individuals. (A list of participants is found in Annex 8.5.) The roles of key stakeholders in the implementation of the NDS are outlined below.

4.1. Government of Rwanda

The two primary ministries that were engaged directly in the development of the NDS were MINAGRI and MINICOM. Their leadership was important in obtaining insights into the preparation of the NDS and they will play key roles in the implementation of the NDS. (See Table 4.1. for their roles in the NDS.)

4.1.1. Ministry of Agriculture (MINAGRI)

MINAGRI will take the leadership role in implementation of the NDS. Currently it is conducting a number of programs with dairy producers and MCCs. Three important agencies under MINAGRI to implement the NDS are the RAB, RALIS and the NAEB.

4.1.1.1. Rwanda Agricultural Board (RAB)

RAB will be the agency responsible for oversight of research and extension on behalf of MINAGRI. RAB operates advisory services in five zonal offices to provide guidance to the district agricultural and sector livestock officers. RAB will liaise with RNDB on issues important to the private sector.

4.1.1.2. Rwanda Agricultural and Livestock Inspection Service (RALIS)

RALIS is responsible for safe import and export of agricultural and livestock products to ensure compliance with all regional and international regulations. RALIS works closely with RAB, NAEB and RBS in the export and import of dairy products to and from regional markets. It will be important to engage RALIS in effective programs to efficiently export dairy products to Burundi and the DRC under the NDS.

4.1.1.3. National Agricultural Export Board (NAEB)

NAEB was reorganized combining the Tea Board, Coffee Board and the Horticulture Board into one organization. The NAEB's mandate has been expanded to develop policies and strategies that now include livestock and animal product exports. The NAEB will implement the NDS by providing guidance on standard settings, processing sites, and promoting dairy exports to Burundi, the DRC and other countries.

4.1.2. Ministry of Trade and Industry (MINICOM)

MINICOM prepared a draft dairy strategy before the NDS began indicating their areas of interests. MINICOM will focus on commercial development and trade of dairy products beyond the farm gate.

4.1.2.1. Rwanda Bureau of Standards (RBS)

RBS is responsible for ensuring that all products on the market are safe to protect the health of the consumer, and secondly to promote grades and standards which facilitate trade. RBS provides training and sensitization for key stakeholders.

4.1.2.2. Private Sector Federation (PSF)

PSF is the professional organization, dedicated to promoting and representing the interests of the Rwandan business community. It is an umbrella organization composed of nine professional chambers. The dairy platform is part of the Chamber of Agriculture and Livestock. The PSF will play an important role in strengthening the RNDB and advocating for private dairy businesses.

4.1.2.3. Rwanda Cooperative Agency (RCA)

RCA plays a critical role in providing capacity building to producer cooperatives. RCA carries out audits of the primary cooperatives and will prosecute cooperative leaders of fraud. RCA needs to be

strengthened so that a cooperative's administration is transparent. RCA can recommend risk management approaches to producer cooperatives.

4.1.2.4. National Cooperatives Confederation of Rwanda (NCCR)

NCCR brings together different cooperative federations of Rwanda with the aim of providing support in establishing proper governance structures that ensure accountability amongst member federations, unions and cooperatives. The NCCR can facilitate cooperatives (SACCOs and MCCs) to create employment and expand access to income-generating activities.

4.1.3. Rwanda Development Board (RDB)

RDB is the investment arm of the GOR seeking investors. Food processing is a priority for the GOR. In some cases, the RDB will support funding a "greenfield" project and then sell or lease the building to a private company. The construction of the Mukamira dairy plant in the Northwest region is an example of this business model, as well as the feed mill in the economic free zone. GOR can consider tax incentives on agricultural inputs and equipment. Currently, tax holidays are not in the tax code. The RDB's target is to have private businesses generate US\$5 – 10 million in export sales of dairy products by 2017.

4.1.4. Other Ministries

Other ministries can be engaged with MINAGRI in joint activities to have a successful NDS.

4.1.4.1. Ministry of Education (MINEDUC)

MINEDUC carries out a school feeding program, and it would be appropriate to integrate the MINAGRI's "one cup of milk per child" with the MINEDUC program. A joint program with a budget for incorporating the two programs together would be recommended. Brazil has a school feeding program which costs around US\$.15 (Rwf 92/child) per child per day, and parents do some cost sharing.

4.1.4.2. Ministry of Local Government (MINALOC)

The Ministry of Local Government (MINALOC) is responsible under the decentralization policy for transferring powers, authority, functions, responsibilities and the requisite resources from central to local governments or administrative divisions. MINALOC is a critical partner in supporting the district and sector leadership in executing their roles in prioritizing economic development strategies and activities for their constituencies and coordinating program implementation and service provision of other ministries.

4.1.4.3. Ministry of Finance (MINECOFIN)

A number of banks operate in Rwanda and some of them lend to agriculture. Some banks are local, such as the Banque Commerciale du Rwanda (BCR) and Bank of Kigali (BK), BRD and BPR. In addition, MINECOFIN oversees a number of MFIs. In most cases, commercial dairy farmers are using their own equity funds to support their dairy operation.

4.1.4.4. Ministry of Health (MINISANTE)

MINISANTE supports a multi-sector strategy joining with other ministries like MINAGRI on food production and MINISANTE focused on nutrition education and sensitization. MINAGRI has the "one

cup of milk per child" and the Gir'inka program. MINISANTE stresses a balanced diet that includes milk. MINEDUC has a program on child education and nutrition and the Ministry of Gender and Family Promotion advocates for good nutrition in the family. This effort makes up the National Multi-Sector Strategy for the Elimination of Malnutrition. The total budget is US\$25.4 million, which ends in June 2013. MINISANTE supports Community Health Workers (CHWs) who act as volunteers and can receive funding under the "performance based funding." Milk consumption is part of their education program.

4.2. Public-Private Sector Partnership

4.2.1. Rwanda National Dairy Board (RNDB)

Interviews conducted with members of the board of the RNDB proved to be important in designing the steps for rejuvenation of this important organization. The RNDB is not a statutory or legislative body but rather operates as a quasi-private entity. Funding support has come from the GOR and from external donors (USAID). Board members spoke about the need to both restructure and refinance the organization with a professional full-time management team.

4.2.2. Dairy Sector Working Group (DSWG)

The DSWG is chaired by the permanent secretary of MINAGRI and members of the group are from both the public and private sectors. The group offers a sounding board for soliciting ideas and comments on the NDS. The DSWG has guided the NDS as part of the PSTA-III.

4.2.3. National Dairy Farmers Federation of Rwanda (NDFFR)

There are 82 primary dairy cooperatives in Rwanda. Some of these cooperatives have a MCC, and some have their own union. In Nyagatare, there is the Nyagatare Dairy Farmers Union (NDFU). There are 17 cooperative MCCs, but only 11 are working at present. The union office is in Nyagatare town. Primary cooperatives are grouped into unions. The district unions then become part of the National Dairy Farmers' Federation of Rwanda (NDFFR). The NDFFR will be an important organization for improving the performance of MCCs.

4.2.4. Dairy Quality Assurance Laboratory (DQAL)

DQAL is a private laboratory service established in 2010 with support from USAID. DQAL is conducting testing on raw milk and processed milk products. The lab receives funding from GOR in the form of free use of a building, electricity and water. USAID provided funds for the equipment in the lab valued at US\$75,000. The number of tests conducted each day is 30–80, and the costs for various quality tests are very low. The implementation of the SoQ program will need the involvement of the DQAL.

4.3. Private Sector Companies and Cooperatives

Private sector companies are strongly encouraged to participate in dairy projects with a special attention to investment in feed mills and dairy processing plants. Cooperatives are a viable business model for producers, and they need to be strengthened with good operational systems.

4.3.1. Private Sector Companies

A number of input supply companies play important roles in the development of the subsector. These firms will be engaged in improving delivery of feed, veterinary supplies, and animal health services. Dairy processing companies, such as Inyange, Savannah, Nyanza, and the new plant in Mukamira will be important players in the implementation of the dairy strategy.

4.3.2. Financial Institutions

The majority of Rwanda's banks and MFIs were visited during the preparation of the NDS. Unlike many neighboring countries, many of the lenders were very eager to engage in financing the sector. Some of the banks and all of the MFIs were willing to finance producers if they had appraisal skills and specialist products (to minimize their risk) to address the sector. Several of the banks, and even those driven by purely private sector values, also had an interest in financing the larger commercial players. The larger lenders also noted that their willingness to lend to commercial dairy enterprises will be driven by their capacity to assess the businesses on the basis of their opportunities and risks, and to deliver finance using appropriate products and strategies. To realize this, they will require both reliable data and technical assistance to develop products and policies from application through recovery. Many financial officers noted weakness in the MCCs. It is understood that BRD will organize workshops to strengthen the MCCs.

4.4. NGOs and Development Partners

A number of NGOs and donors are supporting the dairy subsector. Interviews were conducted with representatives of NGOs and donor agencies, and they provided insights and data for preparing the NDS. Several representatives are members of the DSWG.

4.4.1. Bill and Melinda Gates Foundation – East African Dairy Development (EADD)

The EADD project, funded by the Bill and Melinda Gates Foundation (BMGF), is in its final year in Rwanda. The focus of the project has been in three districts of the eastern milk shed (Gatsibo, Nyagatare and Rwamagana) with their headquarters in Nyagatare. Heifer International (HI) is the lead institution for the project, which includes partners Technoserve, African Breeder Service Total Cattle Management, International Center for Research on Agro-Forestry (ICRAF), and International Livestock Research Institute (ILRI). The BMGF is the donor agency. The project has made good strides in assisting dairy farmers in production and marketing through MCCs as dairy business hubs. EADD brings a regional perspective to Rwanda from other similar projects in Kenya and Uganda.

4.4.2. SNV Netherlands

SNV has had a sustained presence in the dairy industry in Rwanda for several years, and it is currently focused on the northwest region for dairy production. SNV is working in the biogas industry, which can support dairy development.

4.4.3. USAID

4.4.3.1. Rwanda Dairy Competitiveness Program (RDCP-II)

USAID funded the Rwanda Dairy Competitiveness Program starting with phase one in 2007 and then a continuation with phase two in 2012. Land O'Lakes, Inc. (LOL) has been the implementer. The NDS is funded by USAID, and Land O'Lakes oversees the preparation of the NDS.

4.4.3.2. Rwanda Agro-Dealers Development (RADD)

This project is building the capacity of over 1,400 agro-vet shops throughout Rwanda. Many of the operators of these shops are trained veterinary technicians. The operators have an interest to expand and offer animal health supplies and equipment to dairy producers. A number of veterinary supply businesses are based in Kigali and supply these agro-vet shops on a regular basis.

4.4.3.3. Rural Feeder Roads Improvement Program (RFRIP)

There are a number of feeder road initiatives being undertaken by the GOR and their development partners USAID, the World Bank (WB – two districts), the European Union (EU – seven districts), the African Development Bank (AfDB – a few km), the Netherlands (five districts), and IFAD (one district). USAID plans to rehabilitate around 500 to 600 km of feeder roads at a cost of between US\$45,000 - \$50,000 per km. The district administration has agreed to establish a fund of 10% of the construction cost for annual and periodic maintenance. The RFRIP has targeted eight districts (Gatsibo, Nyagatare, Nyanza, Kayanza, Rwamagana, Kamonyi, Ruhango, and Nyabihu) which are all in one of the five milk sheds. Maps have been prepared to determine the roads, and locations of the chilling centers, cheese processing units, animal feed production centers and veterinary clinics. (See Annex Figures 8.4.4.10. - 12.) Community participation is part of the selection process and their agreement to participate in road maintenance.

4.4.4. Heifer International (HI)

HI is supporting dairy farmers with the distribution of improved dairy cows to rural households. This program has been operating for over ten years. HI staff is very knowledgeable about needed policies.

4.4.5. Send A Cow

This non-profit organization is based in the UK, and it has been active in supplying dairy cattle to rural households in Rwanda.

4.4.6. World Food Program (WFP)

The WFP is active in the Central Lakes region and there is the opportunity to supply milk to the Purchase for Progress (P4P) program. The P4P makes cash purchases of local commodities.

Table 4.1. Institutions Responsible for Components and Sub-Objectives of the NDS

Components and Sub-Objectives (SOs)	Objective Summary	Core Management Institutions
Component 1. Improving Milk Production, Productivity, Quality and Standards	Objective: Improved production and supply channels, quality and standards of milk produced at household, smallholder and commercial producer levels	MINAGRI, RAB
SO 1.1.	Lead/Model farmer system development	MINAGRI
SO 1.2.	Input supply and advisory services to small-scale dairy operations	RAB, districts
SO 1.3.	Business diversification and income generation for both men and women in seed and forage production	MINAGRI, MINICOM, RDB
SO 1.4.	Increase milk production in high potential areas for commercial size farmers	RAB
SO 1.5.	Improve access to finance and formal payment systems for the development of the dairy sector	MINICOM, BRD, MINAGRI
SO 1.6.	Livestock extension advisory services	MINAGRI, RAB, districts
Component 2. Milk Collection, Processing, Trade and Consumption	Objective: Improved milk collection, processing and product distribution to reduce costs and increase benefits from economies of scale leading to greater uptake and competitiveness	MINICOM, MINAGRI
SO 2.1.	Improved efficiency and reduced losses in the collection of milk	MINAGRI, RAB
SO 2.2.	MCCs become major consolidation points for formal and AMS sectors	RAB
SO 2.3.	Increased proportion of milk processed for sale	MINAGRI, MINICOM
SO 2.4.	Product diversification and packaging	MINICOM, MINAGRI
SO 2.5.	Increased cheese production and sales	RBS, MINICOM
SO 2.6.	Increased sales of affordable safe dairy products	MINAGRI, RBS, RALIS
Component 3. Policies that improve production, processing and marketing	Objective: Institutional strengthening for policy support to achieve a competitive and sustainable dairy subsector	MINAGRI, MINICOM, Private sector
SO 3.1.	Productivity and animal health	MINICOM, MINAGRI
SO 3.2.	Policy review to improve logistics and road network for collecting milk in rural areas	MININFRA
SO 3.3.	Improve electrical access to dairy producers and MCCs	MININFRA, EWSA, districts
SO 3.4.	Market research to expand outlets both domestic and regional for milk through the formal milk channels	MINICOM, MINAGRI
SO 3.5.	Build capacity program for enhancing skills in the dairy sector	MINICOM, MINAGRI, WDA
SO 3.6.	Build capacity program for enhancing skills in the dairy sector	MINICOM, MINAGRI
SO 3.7.	Promote safe dairy products that meet both domestic and foreign market standards and demand	MINISANTE, MINAGRI
SO 3.8.	Public awareness program on increasing domestic milk consumption	MINISANTE, MINAGRI

SO 3.9	Increased volumes of dairy products exported	MINICOM, RDB, RNDB, RBS
SO 3.10.	Establishment of public-private platform to harmonize dairy sector competitiveness and guide investment	MINAGRI and MINICOM (delegating to their departments or agencies)
Component 4. Implementation and Coordination	Objective: Efficient oversight of NDS implementation and coordination of activities and investments leading to greater competitiveness and management of sector	RNDB
SO 4.1.	Implementation and operating costs of implementation	RNDB

5. IMPLEMENTATION FRAMEWORK FOR THE NATIONAL DAIRY STRATEGY

The implementation plan is the fourth component of the NDS. The partners must make sure that the plan is realistic and performance-based. (See Figure 5.1 below.)

5.1. Institutional Partners

Institutions involved in the oversight, coordination and implementation of the NDS include:

- MINAGRI is the host institution and will be responsible for policy direction. The RAB, as its implementer, shall ensure that strategic interventions and actions in the NDS are mainstreamed in the District Development Plans (IMIHIGO). The relevant budget resources shall be earmarked for transfer to districts to facilitate implementation in line with the decentralization policy strategy. The National Agricultural Export Bureau (NAEB) will also serve as an implementer and promote exports assisting the dairy processors to export to regional markets.
- MINICOM is a key coordinating partner and has the responsibility to ensure that businesses in the NDS value chain are market responsive. In addition, MINICOM has a policy responsibility of ensuring value addition and the development of Micro, Small and Medium Enterprises (MSME) along the dairy value chain. The RBS will support dairy companies to improve the quality of their products to be competitive with other companies trading in the region. The Private Sector Federation (PSF) is a national umbrella organization for private sector institutions, organizations and individuals that plays the role of advocacy and promotion of members' business interests. The functioning of the PSF is organized around chambers and platforms that cut across various sectors of Rwanda's economy. The PSF's advocacy and members' business interests promotion role focuses on horizontal issues such as taxation, business registration and regulation as well as investor protection and business closure process among others. The vertical issues relating to advocacy and members' interests promotion are delegated to sector-specific platforms.
- The Rwanda Development Board (RDB) is charged with improving the business environment for investment promotion. It also has the responsibility of promoting public-private partnerships to facilitate private sector development in taking on its increasing role and responsibility to lead Rwanda's development process as envisaged in Vision 2020. In this respect, RDB's role is to promote investments along the dairy strategy value chain and guide the PPP process in the

oversight, coordination and implementation of strategic interventions and actions envisaged in the National Dairy Sector Strategy.

- The Rwanda National Dairy Platform (RNDP) is the formation of a public-private partnership to allow for the advocacy and promotion of members' business interests which can be effectively articulated and solutions to challenges sought. In addition, the RNDB may highlight and advocate for solutions to issues relating to policy oversight, coordination and implementation aspects identified and reflected in the NDS as well as those that may arise in the course of its implementation.
- Stakeholders are the entrepreneurs and businesses engaged in production, processing and marketing of milk and dairy products. These stakeholders elect the board of directors of the RNDB representing clusters from the dairy value chain.

5.2. Proposed Framework

The appropriate framework for effective implementation of strategic interventions and activities envisaged in the NDS shall be shaped and guided in the form of public-private partnership. (See Figure 5.1.) MINAGRI and MINICOM are the primary originators of the NDS, and these ministries will guide the policies in the NDS in line with Vision 2020. MINAGRI and MINICOM will in turn support their respective implementing agencies (RAB, NAEB, PSF and RBS) in carrying out the NDS. By virtue of its role in promoting PPPs, RDB shall be one of the implementing partners, and it will interact with the RNDB leaders.

5.2.1. Rwanda National Dairy Platform - RNDP (Forum for Public-Private Partnership)

The NDS is to have a strong private sector orientation, which advocates for businesses. The RNDP will be enlarged in an effort to catalyze firms to be proactive in implementing the NDS. The platform will encompass the directors of the RNDB representing the industry members and shall be comprised of producers (farmers), processors and milk sellers. The platform will allow for representatives of public sector institutions to interact with dairy service providers, such as feed manufacturers, livestock inseminators, veterinary services and supplies, among others, who can provide support to the RNDB. To ensure sustainability of the RNDB, its members shall pay an annual membership fee to defray the costs of running a functional secretariat. Development partners will be asked to financially support the board.

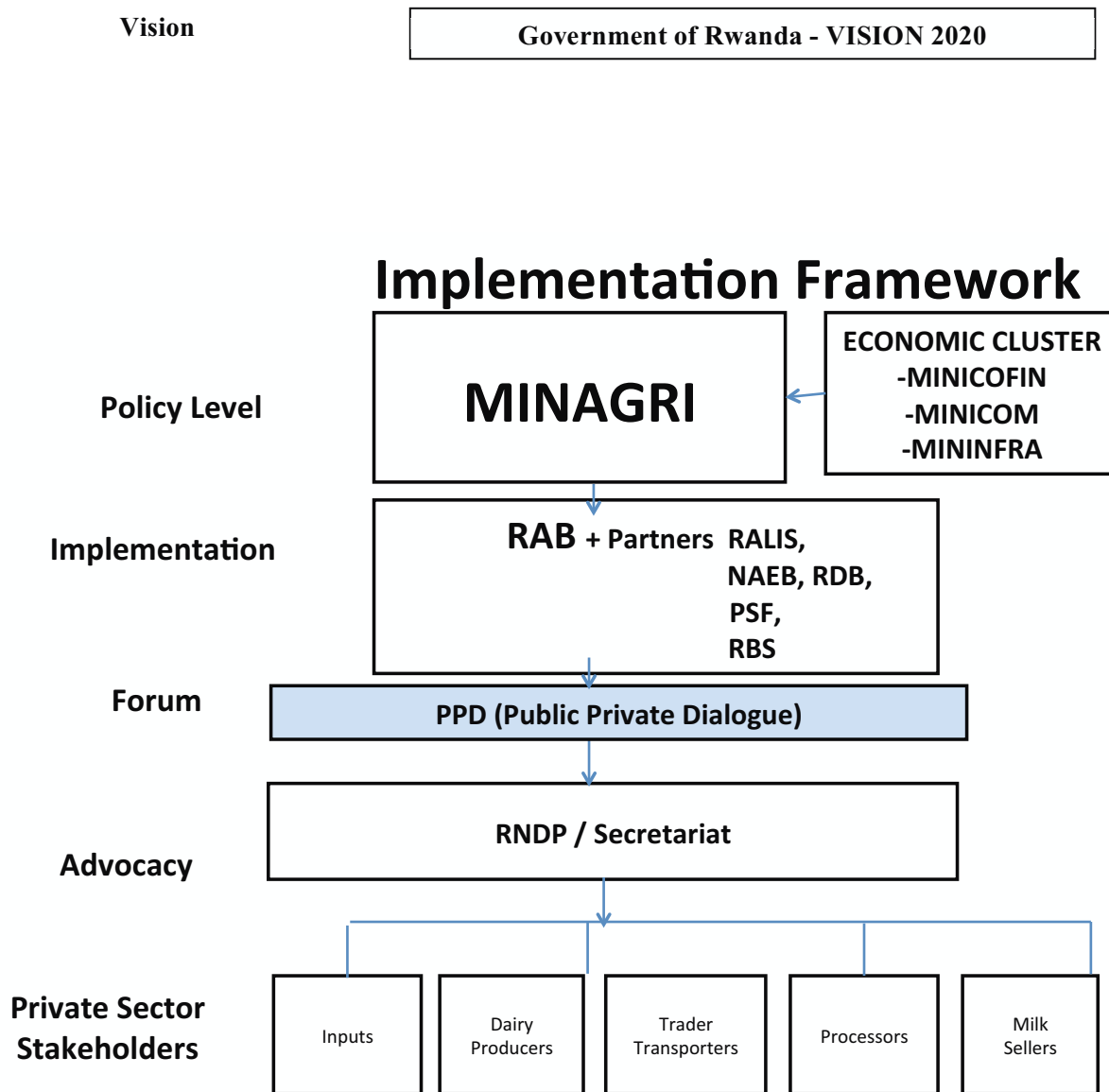
5.2.2. Rwanda National Dairy Board - Secretariat (RNDB-S)

The RNDB-S is the implementing arm of the RNDB and carries out the programs of the RNDB. The RNDB-S operates with activity plans and performance targets set in consultation with the board of directors and the implementing advisor partners including government. The executive director of the RNDB-S will be a business professional who will lead the secretariat's staff.

5.2.3. GANTT Chart

A timeline is important in reaching the milestones established in the logframe of the strategy. Please refer to the Performance Monitoring Plan (PMP) for a logframe of milestones, and the suggested monitoring and audit activities planned in the NDS. A GANTT chart is presented in Table 15.4.8.2. for discussion by all stakeholders on the necessary steps to be taken in the 2012/2013 budget year.

Figure 5.1. Schematic of the Implementation Framework of the NDS



6. FINANCIAL IMPLICATIONS

6.1. Financial Analysis

The implementation of the dairy strategy will require financial resources from both the private sector as well as from the GOR and its development partners. Both public and private sector investments will be needed to reach the target of 80 l/p/yr by the end of 2020.

6.1.1. Private Sector

The private sector will make investments in a number of areas as the quantity of milk increases, and markets are developed in both Rwanda and the region.

- Input Suppliers
 - Feed mills with the capacity to store, process and bag commercial feed
 - Artificial inseminators in equipment kits, liquid nitrogen tanks, cell phones and motorbikes
 - Financial institutions will invest in training personnel in undertaking risk assessment and borrower creditworthiness for specialized financial products for the dairy industry
- Producers
 - Village kraals for 10 – 20 households to hold 20 – 40 head of dairy cows
 - Forage equipment for cutting and baling hay
 - Satellite Collection Centers: producer cooperatives to collect more milk at distances greater than 5 kilometers from the MCC.
 - MCCs for bulking milk from the smaller Satellite Collection Centers
- Transporters
 - Milk cans: conversion from plastic containers to aluminum cans within five years
 - Small mini-vehicles to transport milk from satellite to MCCs - motorized trikes
 - Milk tankers to collect milk from MCCs to processing plants
- Milk Chilling Centers (MCCs)
 - Lab equipment
 - Testing equipment for mastitis
 - Other tests for quality and grading of milk
 - Small pasteurizing equipment: used at a few MCCs to pasteurize milk for the loose container milk market in rural areas, e.g. schools and other institutions
- Processing plants
 - Milk powder plant which could be attached to an existing operation, e.g. the Mukamira plant to absorb large quantities in the flush season
 - Small to medium fluid milk products for export to Burundi and the DRC, other micro-processors of cream cheese, yogurt, etc. (shelf stable products)
- Wholesalers and distributors
 - Mini-warehouse depot for storing product for regional distribution
 - Refrigerated trucks to distribute finished products to local outlets and to export
- Retailers
 - Refrigerated display cases in retail outlets
 - Self-service milk dispensers
 - Milk bars to upgrade equipment to improve hygiene and refrigeration

6.1.2. Public Sector

The public sector will make a number of strategic investments in an array of activities that will accomplish the objective to reach 80 l/p/yr. The aggregated list of investments by components/objectives and sub-objectives is found in Table 6.1. The total budget is Rwf 14.9 billion (US\$24.28 million). There are a number of projects underway or in the planning stage, which will be sources of funds to meet the recommended activities:

- Gir'inka - one cow per household
- "One Cup of Milk per Child" program
- School feeding programs
- IFAD-supported project for water development and MCCs
- Livestock Improvement Support Project
- Feeder road project in collaboration with development partners to link MCCs to processors
- Electrical transmission lines for access by rural households, MCCs and private feed mills

6.2. Return on Investment for NDS

6.2.1. Without the NDS

Under the current situation without the NDS in place, current livestock numbers will naturally increase to 1,670,000 cattle in 2017. With conservative estimates using the same milk yields per type of dairy cow, the production of milk will increase to 1.74 million l/d or 635,939,000 l/yr. With an estimated population in 2017 of 13.488 million people, per capita consumption would be 47.50 l/p/yr. Milk consumption per capita increases only 18.75 percent from 2013 to 2017. The annual growth rate is 3.75 percent. Rwanda has not moved rapidly to close the gap with the WHO-recommended milk intake of 200 l/p/yr. Without the NDS, surpluses of milk will be 100,400,000 l of milk from just the natural growth in the national herd's milk production from the improved dairy cows and this surplus is expected to double in 2020.

6.2.2. With the NDS

The NDS proposes policies, strategies, activities and budgets in four components. The cost of the NDS is Rwf 14.99 billion (US\$24.38 million), which is allocated over five years. (See Table 6.1.) The allocation by component is as follows:

- Component #1: Production and Productivity - 33%
- Component #2: Value Addition and Marketing - 26%
- Component #3: Policy - 27%
- Component #4: Implementation and Monitoring - 14%

The largest portion of the budget (46 percent) will occur in the second year of the five-year plan.

Table 6.1. NDS Budget summary by Component for Five Years (USD and Rwf)

Budget by Component	Year 1 by Quarter				Years 2-5					USD	% Breakdown by Component
	1	2	3	4	2	3	4	5	Rwf		
Component 1. Improving Milk	-	200,000	138,375	323,375	4,652,500	1,279,000	1,159,000	269,000	4,933,068,750	8,021,250	33%
Component 2. Milk Collection,	-	-	164,140	166,450	4,566,750	616,750	662,400	167,400	3,901,492,350	6,343,890	26%
Component 3. Policies, Interventions that improve production, processing and marketing	100,000	180,000	80,000	660,000	1,290,000	1,450,000	1,430,000	1,470,000	4,095,900,000	6,660,000	27%
Component 4. Implementation and Coordination	64,250	109,250	64,250	469,250	637,000	737,000	537,000	467,000	2,001,825,000	3,255,000	13%
Totals by Qtr and Year	164,250	489,250	446,765	1,619,075	11,146,250	4,082,750	3,788,400	2,373,400			
Overall Total									14,932,286,100	24,280,140	100%

2,719,340

NDS Budget Summary by Total Component Cost for Five Years (USD and Rwf)

Budget by Component	Rwf	USD	% Breakdown by Component
Component 1. Improving Milk Production, Productivity, Quality and Standards	4,933,068,750	8,021,250	33%
Component 2. Milk Collection, Processing, Trade and Consumption	3,901,492,350	6,343,890	26%
Component 3. Policies, Interventions that improve production, processing and marketing	4,095,900,000	6,660,000	27%
Component 4. Implementation and Coordination	2,001,825,000	3,255,000	13%
Total	14,932,286,100	24,280,140	100%

The cattle herd will increase from 1.33 million head to 1.67 million head in 2017, and the distribution of dairy cows by class (local, crossbred, and purebred) will remain unchanged from 2012. In 2017, the annual production of milk will increase to 810,558,000 l/yr or 2,220,000 l/day. Per capita consumption is estimated at 60.55 l/p/day. The NDS would result in an incremental increase of 174,600,000 liters of milk. In 2020, milk production will increase to 1,161,498,000 l/yr or 3,200,000 l/day. The per capita consumption of milk will be 80 l/p/yr from 611,000 improved dairy cows in 2020. The yield per cow will increase to 2.4 l/d for local, 9.2 l/d for crossbred, and 13.3 l/d for purebred cows.

The incremental benefits with the NDS program are measured with two indicators:

1. The average increase in new jobs after taking into account the natural growth in new jobs times the value of annual wages earned. (Each additional 5,000 l marketed off the farm creates one new job in the dairy subsector.)
2. Ten (10) percent of the value of the additional milk produced goes to the dairy household.

At the end of 2017, the following outputs occur:

- The incremental increase in new jobs in five years created with the NDS (above the natural increase in jobs) is 34,924.
- The economic impact of job creation on the national economy is as follows:
 - direct income in wages received by new workers is Rwf 8.43 billion (US\$13.7 million); and,
 - the indirect income multiplier (two times the direct effect) is Rwf 16.9 billion (US\$27.4 million).
- Increase in share to producers from the net incremental sales value with the NDS:
 - direct income from sales of additional milk is Rwf 18.55 billion (US\$30.2 million); and,
 - the indirect income multiplier (two times the direct effect) is Rwf 37.1 billion (US\$60.4 million).

The net present value of the flow of net benefits over the five years of the NDS is an estimated Rwf 4.8 billion (US\$7.8 million). This is based on a conservative estimate of an opportunity cost of capital of 18 percent. The payback period for when the flow of benefit turns positive is at 3.25 years. The internal rate of return on the investment is 47 percent. These are positive results indicating the suitability of investing in the NDS for the improvement of the dairy subsector.

7. PERFORMANCE AND MONITORING PLAN (PMP)

The GOR has set out in Vision 2020 that the country will reach middle-income status by the year 2020. The performance of the NDS will be judged on the dairy subsector contribution to reaching a target of production that is commensurate with this income status and complementary in contributing to the economy, as well as to the nutritional wellbeing of Rwandans. Both goals are closely linked. The Performance and Monitoring Plan (PMP) sets out in detail the steps to ensure that objectives are met necessary to achieve the goals of Vision 2020. The results from interventions in Component 1 (production, productivity) will need to show progress towards production of 1.161 billion liters in 2020. Similarly, the results from interventions in Component 2 (marketing and value addition) will lead to per capita milk consumption reaching 80 l/p/yr in 2020, which will meet the expected milk production. A careful balancing act occurs through policies (Component 3) necessary to ensure that both sets of interventions (production and consumption) are on-schedule and balanced. The PMP is the tracking tool that complements the NDS to assist those stakeholders responsible for overseeing this transition. The PMP is set up with two main purposes: (1) implementation monitoring and (2) results monitoring.

7.1. Implementation Monitoring

The framework for the NDS is such that MINAGRI and MINICOM (and their implementing agencies) share dual roles in setting the vision and the policies to achieve the stated goals for the dairy subsector by 2017 and beyond. In addition, the RNDB is tasked with the day-to-day operation on the part of the private sector to ensure that interventions are started on time and that stakeholders are continually engaged in the progress. Communication is vitally important to ensure that all the principal stakeholders fully participate in the public-private partnership.

Each component of the strategy has a number of sub-objectives with activities to be carried out. Key institutions have been identified, and whether they are in the public or private sectors. These implementers will need to be engaged on a regular basis (with progress reports every month for the first six months as an activity begins and then once per quarter after that.) Identification of resource flows (sources and uses of funds) is important to ensure that funding for capital costs or operating costs are released in a timely manner. The release of funds becomes part of the "mid-term" and "end of program" evaluation when estimating the financial returns on the investments made in the dairy subsector. A preliminary estimate of 47 percent for a return on investment for the NDS has been presented in the strategy based on *ex-ante* projections. It will be important to conduct an *ex-post* analysis after the initial five years to determine the actual deviation to the initial estimate.

7.2. Results Monitoring

The interventions are designed to achieve outputs which when taken together lead to the outcomes expected from the NDS. In preparing the NDS, it is evident that baseline data from which to measure progress towards the goals in 2017 and beyond are not available. An initial task is for the NDS implementation team to establish credible baseline estimates. At the heart of the NDS lies the intention to do things better, more efficiently as well as more effectively in the interest of milk production minimizing losses and maximizing capacity available. Accurate measurements depend on benchmarking the current situation. There is simply insufficient information about dairy production and transportation and levels of

surplus milk in the country. Some benchmark indicators do exist from MINAGRI and other sources, but these will require review and confirmation. Other indicators or benchmark points will require specific study based on surveys. For example, these could include:

- Milk production by target groups by milk shed for lead farmers and village kraals and their costs of production;
- MCCs and their satellite centers and the costs of chilling and transporting a liter of milk;
- Processors and how they utilize their install capacity, products manufactured and costs of production;
- Demand in the domestic end-markets by segments (retail, food service, and institutional – school feeding); and,
- Demand in Burundi, the DRC and other countries (product types, package sizes, quantities and prices) and a standardized protocol to collect information from the Rwandan customs service on the import and export of dairy products.

7.3. Logframe

The logframe is a matrix in which the four components of the strategy are linked in a "cascading" effect beginning from the goal. Outcomes lead to outputs, which lead to activities and to the necessary resources (inputs) to carry out the interventions. The framework is logical and allows for understanding critical linkages in project design and implementation. In the NDS, the logframe identifies a number of objectively verifiable indicators (OVI), which act as a measuring stick of performance. These indicators set the conditions for success, and for the most part the NDS uses quantitative data, which can be measured. Indicators have been developed to be as Specific, Measurable, Appropriate, Realistic and Time-bound (SMART) as possible and for them to last the duration of the strategy.

The NDS has a number of indicators that have measurable outputs. The initiation and timing of the activities are important for achieving long-term outcomes that are sustainable after the project period ends in 2017. The accompanying logframe for the NDS includes a short description of the activity under a sub-objective, as well as the steps for measuring and validating the expected outputs. (See Table 3.1.) In addition to the OVIs, a short description is provided in the table on how the OVIs will be measured (Measurable Objectively Verifiable Indicator - MOVI) to verify the impact of the activity and eventually the sub-objective. The last column in the table presents a risk assessment of possibly why the indicator may not be realized. (See Annex Table 8.3.10.2. for the longer version logframe by components and sub-objectives.)

7.4. Reporting

Reporting is an essential part of the overall success of the NDS. Reporting serves several purposes. Sketching out the structure of the reports will facilitate data gathering. (See full PMP report on prototype forms for collecting and reporting information.) Since reports will be regularly produced, a consensus is needed on how to store and analyze the data. The reports need to be tailored to specific readers. If the private sector is the target, then this may change the format of the report versus for the public sector agency. Finally, reports will need to be disseminated to stakeholders and this needs to be agreed to in the

planning stage of who is responsible for the communication program. A pertinent question is the form of distribution – paper or digital. If a larger audience is envisioned, then newspaper, television or radio may prove useful. The planning on reporting procedures needs to occur in the first quarter of 2013 and be put into a planning document. The reports become important to keep policy makers current on the progress to achieving targets for the dairy subsector set for 2017 and beyond.

7.5. Time Frame

An illustrative time chart showing tasks in the PMP over the five years of the NDS is illustrated in Annex Figure 8.4.10.1. The chart breaks out activities by quarter and identifies representatives from key ministries for tasks to be performed.