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## **Agricultural Recovery: Food Security and Beyond**

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# Agricultural Recovery

## *Food Security and Beyond*

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**B**urundi is still experiencing a major food crisis. One important element that will help to avoid new episodes of violence is revised agricultural policies that support sustainable food security. Food crops and livestock supply 91 percent of agricultural GDP and the major livelihood for most households, thus it is essential to promote production and commercialization of subsistence crops and livestock. These subsectors currently perform poorly and foster a chronic food deficit, a condition that underlines the extreme vulnerability of the population to production-related risks.

With food demand increasing at an annual rate of 3 to 6 percent, it is urgent to improve the contribution of the subsistence crops and livestock subsectors. The potential for improvement is great, and beyond the need for reforms that will benefit all sectors, improvements will require public investments to enhance productivity and better market access. Necessary changes in the short-run include fostering the use of high-quality seed and fertilizer, and improving the management of small livestock. In the long run, research-extension links should be strengthened, producer organizations should be encouraged and supported, and sustainable land and water management practices should be promoted. Investments in infrastructure and market intelligence will need to meet demands generated by the development of urban centers and foster competitiveness of Burundian agricultural commodities relative to those from the region.

This chapter explains the food security issue in Burundi and identifies priority actions that will help overcome the major obstacles that prevent growth and improvement of the subsistence crops and livestock subsectors.

## Food Security and Food Aid<sup>15</sup>

The food situation in Burundi remains a matter of great concern. For several years, food crises have been rife in certain parts of the country, a result of several factors. First is the impact from the conflict in certain regions of the country that lasted until 2005. A second factor is insufficient food production, not only during the period of conflict, but also as a result of successive droughts from 2000 onward and illnesses and parasites that suffocate cassava and banana crops. A third factor is the rapid population growth resulting from high birth rates and the return of refugees that generated increased food needs and reduced the area of farmland per inhabitant. Based on a study conducted by Dianga, Wodon, and Zoyem (2007) using data from the QUIBB household survey of 2006, the aim of this note is to assess food insecurity in Burundi and then analyze the impact and performance of food aid, and especially the World Food Programme (WFP), on the situation.

### *Ranking Burundi According to the Global Hunger Index*

Burundi is among countries where food insecurity is most widespread, a problem that can be illustrated by the Global Hunger Index (GHI), the arithmetic mean of three indicators:

- Proportion of the population undernourished (the population that does not have the minimum caloric intake required for good health, PU);
- Percentage of children under five-years-old who are underweight (UWC); and
- Rate of infant mortality (IM).

Of the 119 developing countries for which the GHI has been calculated, Burundi ranks last. Burundi's GHI rose from 27.7 percent in 1981 to 32.3 percent in 1992, 39.7 percent in 1997, and 42.7 percent in 2003. Figure 3.1 presents the GHI values for other countries in Sub-Saharan Africa ranked in decreasing order for 2003. As illustrated in Figure 3.2, the increase in the GHI in Burundi is primarily due to an increase in the proportion of the population that is undernourished, a consequence of an inadequate food supply, whether produced locally or imported.

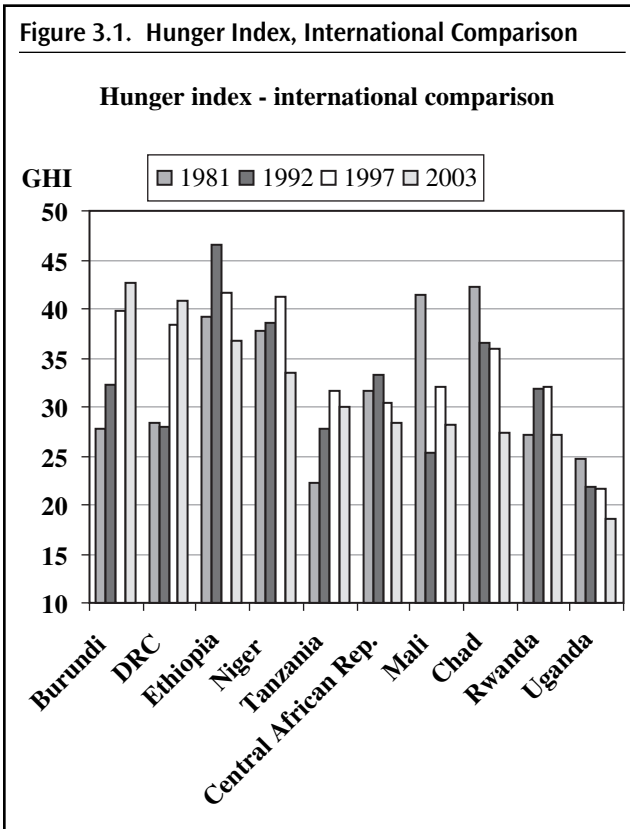
It may be that national food production has been underestimated in the GHI calculations for Burundi, in particular because household self-consumption may be underestimated. Nevertheless, the available data on national food production suggest a collapse. In 2005, the indicator of production per inhabitant (in kilograms of cereal equivalent) measured only 55 percent of its 1993 level (the pre-war level).

### *Typology of Households Suffering from Food Insecurity*

In 2004, the WFP office for Burundi conducted a study on food insecurity. The results from the QUIBB household survey of 2006 can be used to update and improve previous work in this area, among others by constructing a typology using Multiple Correspondence Factorial Analysis. Seven categories of households (including a 'category 0' for the capital) have

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15. This section was written by Quentin Wodon (Lead Poverty Economist, AFTPM, World Bank) and Jean-Paul Zoyem (Consultant, Casafrique).



Source: IFPRI.

households count at least one handicapped person—a rate four times higher than the national rate. The rate of employment is low, with two households in three claiming that neither the head of the household nor his/her wife/husband is employed. At the same time, the head of one household in four is unmarried and responsible for the well-being of more than three other people. Indeed, category 4 comprises a great many female heads of household who are both old and widowed, but with children. The advanced age of the heads of household in this category also explains the low level of schooling observed.

Individuals in category 3 have an average caloric intake of 1,714 kcal per adult equivalent per day. Unlike category 4, we observed a low proportion of handicapped individuals, however, persons suffering from long-term illnesses are particularly present. Category 3 is also marked by the presence of large families—two in three people live in a household with at least six members. The employment rate of heads of household is high, but income is insufficient to satisfy household needs. This category is marked by a low level of physical capital, in part resulting from the difficulties experienced by former refugees and displaced persons as they resettle. The latter are over-represented in category 3—nine of 10 heads of household are former refugees, with many only recently resettled. The population in the areas of Murmirwa and Imbo, including the province of rural Bujumbura, is over-represented in this category.

been identified using this technique. Figure 3.3 gives the population share per category. Categories 3 and 4 (29 percent of the population) suffer from severe food insecurity. Categories 2 and 5 (39 percent of the population) are at risk of food insecurity. We focus here on the main characteristics of categories 4 and 3 (the most vulnerable).

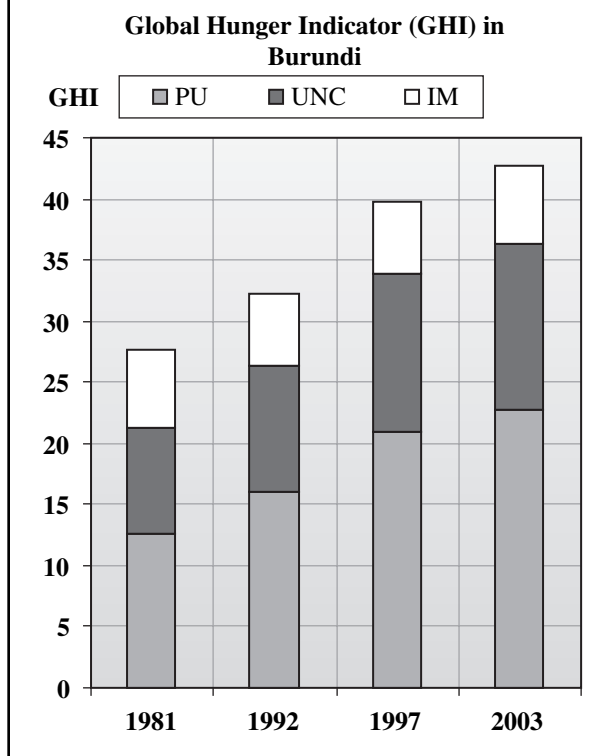
Category 4 has the lowest caloric intake level (1,563 kcal per adult equivalent and per day, well below the required minimum, which varies between 1,900 kcal and 2,100 kcal) and one of the lowest food diversity scores (low variety of food-stuffs consumed). This category suffers from low human capital and 52 percent of the constituent

### Household Food Consumption and Caloric Intake

In order to measure the capacity of the households to satisfy their food needs, the caloric intake of food consumption was estimated using the QUIBB 2006 data. At the national level, the average caloric intake is 2,086 kcal per adult equivalent per day, with these specific categories: (a) very low caloric intake (less than 1,400 kcal), 34 percent; (b) low caloric intake (1,400–1,900 kcal), 22 percent; (c) moderate caloric intake (1,900–2,100 kcal), 7 percent; (d) acceptable caloric intake (2,100–2,900 kcal), 18 percent; and a high caloric intake (more than 2,900 kcal), 19 percent. Thus more than one-half (56 percent) of the population has a caloric intake of less than 1,900 kcal.

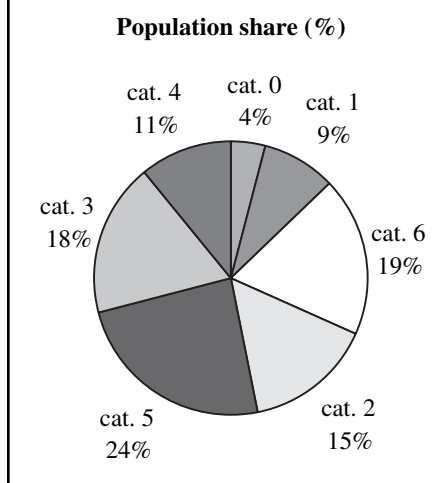
Caloric intake varies by location. The share of the population with a very low caloric intake is twice as large in rural compared to urban areas. In the northern region of the country, almost one-half of the population has a daily caloric intake of 1,400 kcal. In the south, less than one-fifth of the population lives in a household with a very low caloric intake. These observations are very similar if a threshold of 1,900 kcal is used to identify food insecurity. The map in Figure 3.4 illustrates the proportion of individuals living in households with a daily caloric intake per adult equivalent below 1,900 kcal. Caloric intake is lower when the household is large and the level of schooling is low, varying from 1,713 kcal for households with more than six members to 3,028 kcal for those with fewer than four members. Caloric intake is higher when the

Figure 3.2. Global Hunger Indicator (GHI), Burundi



Source: IFPRI.

Figure 3.3. Population Share (percent)



Source: Diagna, Wodon, and Zoyem (2007).



Parameter	Total population			Beneficiaries		
	Without donations	With donations	Difference	Without donations	With donations	Difference
Spending per adult equivalent (FBu)	528.08	536.3	8.22	400.93	508.9	107.97
Calories per adult equivalent (kcal)	2,016.20	2,076.91	60.71	1,547.71	2,345.43	797.72
Rate of monetary poverty (percent)	67.91	66.85	-1.06	77.07	63.05	-14.02
Rate of extreme poverty (percent)	48.59	47.36	-1.23	61.62	45.45	-16.17
Rate of food insecurity (% , 1,900 cal)	58.11	56.3	-1.81	73.97	50.19	-23.78
Rate of extensive food insecurity (% , 1,400 cal)	36.57	34.35	-2.22	58.17	28.89	-29.28

Source: Diagna, Wodon, and Zoyem (2007).

the household receives a large food donation, incentives to resell food aid, or other behavioral changes (for example, household labor supply) that can reduce the impact of donations. Table 3.2 shows that the impact as estimated by the matching method is lower than the impact as estimated by the naïve approach, although they remain significant for the households benefiting from WFP rations.

### *WFP Targeting Performance*

Qualitative studies of WFP targeting performance in Burundi revealed that numerous obstacles tend to restrict targeting performance, a fact which is hardly surprising in a coun-

Parameter	Naïve approach		Matching approach <sup>a</sup>	
	Estimated impact	Estimated impact	Lower impact limit	Upper impact limit
Spending per adult equivalent (FBu)	107.97	67.4	36.2	98.7
Calories per adult equivalent (kcal)	797.72	420.4	228.6	612.2
Rate of monetary poverty (%)	-14.02	-10.1	-16.4	-3.8
Rate of extreme poverty (%)	-16.17	-8.6	-14.5	-2.8
Rate of food insecurity (% , 1,900 cal)	-23.78	-9.7	-15.7	-3.8
Rate of extensive. food insecurity (% , 1,400 cal)	-29.28	-7.0	-12.5	-1.6

a. The results of the matching method include a statistical measurement of the upper and lower limits of the impact (confidence interval at 95 percent of the estimated impact).

Source: Diagna, Wodon, and Zoyem (2007).

try emerging from a prolonged conflict. To reduce these obstacles, since 2000 the WFP has introduced local food distribution committees intended to make the targeting methodology more participatory and ensure better targeting of the poor. The introduction of these committees seems to have improved targeting in 2000 and 2001, but in 2002 once again observers saw vulnerable members of the population complain that they were omitted from the program. Moreover, the sale of WFP provisions had apparently again become widespread in 2002, especially close to towns.

As a result, the WFP took additional measures, including: (a) increased sensitization of administrative authorities and communities to improve targeting of aid and obtain the assistance of the administration to discourage sale of rations; (b) institutionalization of public approval of beneficiary lists to enable local communities to identify non-vulnerable persons mistakenly or fraudulently targeted; (c) increased role for charity organizations in the targeting process following the food crisis witnessed in the north of the country in 2004/05; and (d) review of the distribution methodology to encourage “scooping” (rations given individually to households) rather than “grouping” (rations allocated to groups) to reduce sale of WFP rations on the market. In addition to these measures, the budget and resources allocated to the distribution partners have been reviewed upward since 2005 so that these partners can better assist local committees during the targeting process and find it easier to perform the scooping procedure, in particular in zones recognized by the WFP as “difficult zones.” Despite these initiatives, according to certain observers, targeting beneficiaries remains problematic in Burundi.

The QUIBB data 2006 enabled us to measure the WFP targeting performance. Two indicators were used. The first, omega ( $\Omega$ ), is the share of donations allocated to the poor divided by the proportion of the poor in the total population. A value of 1 for this indicator suggests that targeting is neutral. A value greater than 1 implies that, on average, the poor receive more donations than the population as a whole, while a value less than 1 implies that the poor receive fewer donations than the population as a whole. The second parameter, gamma ( $\gamma$ ), is the share of subsidies received by the poor, which depends on the poverty rate (the smaller the number of poor, the smaller the share of subsidies they receive). The values of the parameters omega and gamma as they relate to WFP were compared to the values obtained for other types of subsidies.

Table 3.3 shows that the value of omega fluctuates between 0.84 and 0.93 depending on the criteria used to identify the poor. Four criteria were used: (a) monetary poverty; (b) extreme monetary poverty; (c) food insecurity (threshold of 1,900 kcal per day per adult equivalent); and (d) severe food insecurity (threshold of 1,400 kcal per day per adult equivalent). Whatever the criteria considered, the poor received slightly less in terms of WFP donations than the population as a whole because omega is slightly lower than 1. This result is disappointing because we hoped that the WFP targeted the poorest as a priority. Nevertheless, it is not surprising considering the targeting difficulties experienced in a country such as Burundi. As for the share of WFP resources benefiting people living in poverty or extreme poverty and people suffering from food insecurity or severe food insecurity, it fluctuates more than the omega parameter because the population shares in these categories also fluctuate. It should be noted that the value of omega lower than one is also due to the fact that at the time of the survey, the aid provided by the WFP was focused in large part on rations designed to avoid that farmers eat the seeds that they should use instead for the next cropping season. This means that some landless households who are



highly vulnerable may not have benefited from the program at the time of the survey, while they may have benefited from a different component of the program at another time. Also, while the targeting performance of the program is not necessarily pro-poor as measured at the time of the survey, the share of the beneficiaries of the aid that are poor (or food insecure) is higher than the share of the aid that is going to the poor (or food insecure). More details on the results obtained for the beneficiary incidence (as opposed to the benefit incidence) of the program are available in Diang'a, Wodon and Zoyem (2007).

Finally, although the WFP resources are not particularly well targeted, the performance of the program is nevertheless better than a number of other public spending programs. Table 3.3 gives the values of parameters  $\omega$  and  $\gamma$  as they relate to education in state schools (primary, secondary, and higher education), healthcare in public structures, and implicit subsidies in the water and electricity tariff structure. The WFP distributional impact is similar to that of the health services and falls between the performances of primary and secondary education. It is much better than that of higher education and the implicit subsidies for basic infrastructure services. In this last case, the very low values of the parameters are because a very small proportion of the population has access to the electricity and running water networks. A more detailed analysis of the WFP targeting performance suggests that one of the limits of the program is that in 2006 the WFP did

Parameter	Monetary poverty		Extreme monetary poverty		Food insecurity (1,900 kcal)		Food insecurity (1,400 kcal)	
	$\Omega^a$	$\gamma^b$	$\Omega^a$	$\gamma^b$	$\Omega^a$	$\gamma^b$	$\Omega^a$	$\gamma^b$
<b>Food transfers</b>								
Private transfers	0.82	0.56	0.75	0.37	0.92	0.54	0.97	0.36
WFP transfers	0.89	0.60	0.84	0.41	0.87	0.51	0.93	0.34
<b>Education</b>								
All cycles	1.08	0.72	0.77	0.51	0.90	0.60	0.55	0.37
Primary	1.10	0.73	0.79	0.53	0.91	0.61	0.55	0.37
Secondary	0.79	0.53	0.52	0.35	0.71	0.48	0.45	0.30
Higher	0.49	0.32	0.13	0.09	0.66	0.44	0.66	0.44
<b>Health</b>								
All consultations	0.89	0.60	0.60	0.40	0.78	0.52	0.47	0.32
Public hospital	0.81	0.54	0.54	0.36	0.70	0.47	0.40	0.27
Public dispensary	0.91	0.61	0.62	0.41	0.79	0.53	0.49	0.33
<b>Infrastructure</b>								
Electricity subsidies	0.10	0.06	0.06	0.03	0.24	0.12	0.16	0.05
Water subsidies	0.15	0.09	0.12	0.05	0.28	0.14	0.19	0.05

a. Share of donations allocated to the poor divided by the proportion of the poor in the total population

b. Share of subsidies received by the poor

Source: Authors' estimates using the QUIBB survey 2006.

not seem to specifically target areas in the country where food insecurity was most severe. In the new WFP program document for 2007–2008, the geographic targeting mechanism of the WFP is to be improved and we can therefore hope that the targeting performance is better today.

### *New Direction for Food Aid in Burundi—From Emergency to Recovery*

The WFP and its targeting performance in February/March 2006 had a significant impact on its beneficiaries, but the poorest members of the population did not necessarily benefit more than the rest of the population. We next describe new directions for the program in 2007 and 2008, illustrating how these new orientations are appropriate in light of changing needs in the country and the results presented above.

According to WFP documents, the program will provide a total of 145,948 tonnes of food provisions in 2007 and 2008 at a cost of \$118 million, including \$50 million to purchase the provisions. The objectives of the program are to: (a) provide humanitarian aid to victims of drought and conflicts, as required; (b) protect and strengthen subsistence resources and increase the resistance of vulnerable households to crises in the areas suffering most from food insecurity; (c) improve the nutritional and health status of children, mothers, HIV/AIDS groups, and other vulnerable groups; and (d) promote access to education, in particular for girls. In general, the objective is to progressively move from emergency actions to recovery, and thereby provide a more significant contribution to the medium- and long-term development of the country and its population.

Given that emergency needs will not disappear overnight, the first area of intervention will remain aid programs targeting vulnerable households by means of targeted distribution of rations (70 percent of food aid) in the northern and northeastern provinces, which suffer the most from food insecurity. This geographic targeting should help to improve program performance. Distribution of rations will take place during the lean seasons, October to December and March to May. These rations will relieve hunger until the next harvest, presumably helping households to avoid consumption of their seeds and preventing acts of survival with negative long-term consequences such as the hasty sale of family assets and production goods.

A second line of intervention will involve “recovery” programs in the zones suffering from food insecurity. These activities will provide a safety net for the populations suffering from chronic food insecurity, in particular by means of “food for work” (FFW) projects, school meals, and nutritional activities. FFW activities will preserve and create productive assets by increasing productivity, improving the land, protecting the environment, and repairing rural roads. Pilot schemes will be introduced to demonstrate the advantages of generally upgrading and preserving the land. The zones of activity will be selected at a local level according to social, agro-ecological, and landscape criteria.

A third section of WFP activity will involve health and nutritional programs. The WFP will distribute rations to children under five-years-old suffering from malnutrition and to their mothers in 200 complementary food centers and 20 therapeutic food centers managed by international NGOs. This aid will complement targeted distribution implemented in the northern and northeastern provinces, which suffer from severe food insecurity, and is also intended to combat moderate to serious malnutrition in vulnerable households in

other regions. The WFP will also support the gradual transfer of responsibility for these centers to the provincial health authorities.

A fourth aspect of the WFP activity will involve humanitarian aid to refugees and returnees (food aid represents the main source of food for refugees). The WFP will also provide food rations to asylum seekers registered by the Refugee High Commission, which forecasts that 70,000 Burundian refugees living in Tanzania will return to their country in 2007 and a further 55,000 in 2008. A fifth aspect of the program will target food for education programs (FFE). Some 20,000 pupils in 180 primary schools already benefit from this activity (providing one hot meal per day), and the figure should reach 320,000 pupils in 250 primary schools in 2007 and 2008.

With the return of peace, food security will gradually gain ground, and it is quite natural that the WFP should place a lower emphasis on emergency operations to the benefit of food crisis prevention programs and national recovery schemes. This reasoning has led the WFP to also set up food programs in teaching establishments and professional or traditional training centers, as well as introducing the FFW projects. The aim of the WFP is henceforth to introduce an increased number of social reinsertion schemes that will help break the poverty and hunger cycles rather than continuing to rely mostly on emergency operations.

The new directions of the WFP are most welcome in light of the changing needs of the population and the results described in this paper about the impact of the program and its targeting performance. The risks of poor targeting are less significant in FFW programs or when the distribution of food targets the poorest areas of the country. The risks of misappropriation are also lessened when the aid targets schools or health and nutritional centers. At the same time, diversifying WFP operating methods will require careful consideration to reduce transport and administrative costs, for example, by testing pilot programs to provide cash donations in place of food donations when the capacity will be there to test such a pilot program. It will also be necessary to rethink the targeting and impact improvement procedures that would be appropriate for each sub-program introduced (programs for school canteens are very different than FFW distribution schemes). Finally, it will be necessary to collect new household survey data to evaluate whether the new directions proposed by the WFP for its programs will indeed increase program impact on the well-being of the populations, in particular, appropriate targeting of the neediest groups.

## Food Crop Subsector<sup>16</sup>

Agriculture in Burundi is dominated by small-scale, subsistence-oriented family farming units. Between 90 and 95 percent of the country's 1.2 million households live in rural areas and produce most of the food they consume. Virtually every household grows a mix of food crops, sometimes associated with cash crops, and virtually every household keeps some animals. The emphasis on diversification and self-reliance is a rational strategy that has emerged in response to the concurrent pressures of intensification (caused by the shortage of agricultural land), the unreliability of food markets (a legacy of the recent

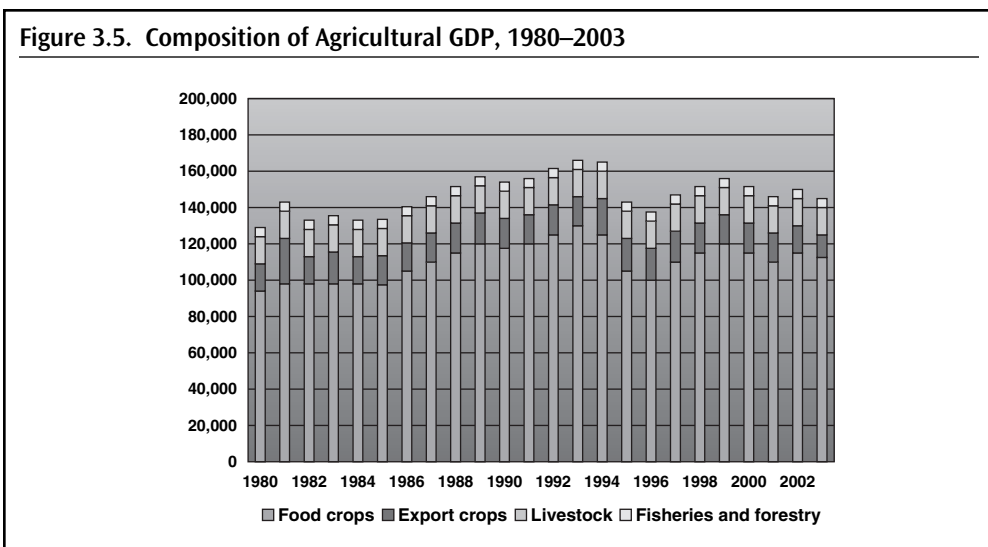
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16. The section was written by Michael Morris (Lead Agriculture Economist, AFTS3) with the participation of Vincent Glaesener (FAO), Patricia Larbouret (FAO), and Alexander Kavalec (FAO).

period of civil conflict), and lack of opportunities to earn income outside of agriculture (resulting from the underdeveloped nature of the non-farm rural economy).

Food crops occupy a large proportion of agricultural land in Burundi (28 percent of the total land area and 85 percent of the total cultivated surface). The leading food crop categories, ranked in terms of production, are bananas, roots and tubers, legumes, cereals, vegetables and fruits, and oilseeds. The importance of food crops to the national economy is enormous (Figure 3.5). Food crops contribute 46 percent of GDP and 80 percent of agricultural GDP. In comparison, export crops contribute only 4 percent of GDP, although cash crops generate 90 percent of export earnings. Livestock contribute 5 percent of GDP, and fisheries contribute 2–3 percent. The economic importance of food crops at the national level is mirrored at the household level. With approximately 95 percent of the population living in rural areas and engaged in subsistence farming, it follows that food crops are the main source of employment and rural household income. Food crops and livestock produced for home consumption account for approximately 73 percent of total revenue earned by rural households, with the other 27 percent coming from sale of cash crops and labor.

Most food crops produced in Burundi are consumed by members of the household that produced them. The share of production that is home consumed varies from one commodity to another, but for all food crops combined it ranges between 70 and 80 percent. Home-consumed food crops account for about 70 percent of total food intake in rural areas, but only 1 percent in urban areas. Food crops contribute 40 percent of total protein consumption, 22 percent of lipid consumption, and 100 percent of carbohydrate consumption.



### *Performance of the Food Crop Subsector*

*Production Systems.* Food crop production systems in Burundi have evolved in response to the high population density and associated acute scarcity of agricultural land. With the land frontier having long ago been exhausted, production gains recorded in recent years have been achieved through intensification of production on land already

being exploited. The intensification process typically involves: (a) introduction of new short-duration cultivars to cropping rotations so as to effectively increase total cultivated area; (b) adoption of agro-forestry practices to facilitate exploitation of steep slopes, permit diversification of income sources, provide protection against soil erosion, and contribute to restoration of soil fertility; (c) increasing use of roots and tubers that are less demanding on soil fertility, less susceptible to insect pests and diseases, and that can be left in the ground for longer periods and harvested outside the normal harvesting periods; and (d) systematically practicing multi-level associated cropping, which optimizes the use of the limited area and workforce. The characteristics associated with different stages of intensification are summarized in Table 3.4.

*Yields.* Yields of most major food crops grown in Burundi have changed very little during the past 40 years. Productivity gains resulting from the uptake of improved cropping practices have thus apparently been offset by soil fertility losses. Food crop yields in Burundi are low. When yields in Burundi are compared to yields in other countries, it is

**Table 3.4. Simplified Typology of Production Systems Based on Soil Fertility Management Practices**

Parameter	Farms located in areas of medium population density (100–400 inhabitants/km <sup>2</sup> )	Farms located in areas of high population density (400–800 inhabitants/km <sup>2</sup> )	Farms located in areas of very high population density (> 800 inhabitants/km <sup>2</sup> )
Cropping systems	Extensive cropping of: cereals, legumes, roots and tubers	Intensive cropping using complex associations: banana, cereals, roots and tubers, legumes, Development of marshlands	Multilevel permanent cropping: fruit trees, banana, roots and tubers, legumes, cereals Development of marshlands
Livestock systems	Pasture readily available Animals allowed to graze free during the day and returned to the farm at night	Pasture increasingly scarce Limited free grazing Most animals tethered or kept in stalls	Pasture no longer available Animals kept in stalls Forage and water brought to animals
Fertility management practices	Lateral fertility transfers from pastures to cropland via livestock No use of mineral fertilizer Limited use of fallowing	Decreasing lateral fertility transfers from pastures to cropland via livestock Increasing role of bananas and other trees in soil protection and fertility management (agro-forestry) Some use of mineral fertilizer	Major importance of banana and other tree species trees in fertility improvement Use of legumes to fix nitrogen Use of mineral fertilizer
Management of trees and agro-forestry	Land cleared Trees minimally integrated into the farming system	Use of live hedges Planting of fruit trees	Three-level cropping: forest trees, fruit trees, associated crops

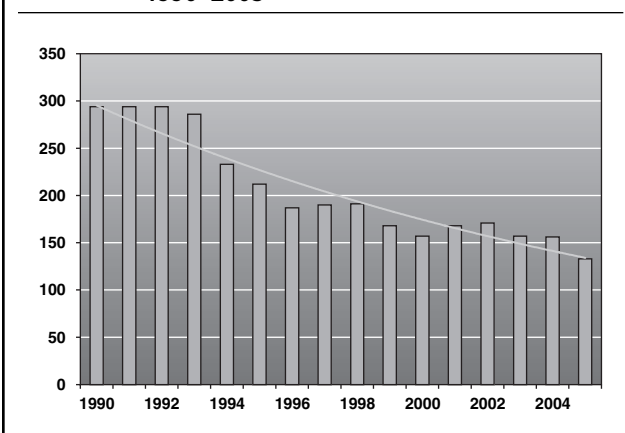
clear that Burundian agriculture is facing a productivity crisis. Using FAOSTAT data to make comparisons more consistent, average yields achieved in Burundi for most major food crops lag behind Sub-Saharan Africa averages.

*Production.* Production of food crops in Burundi has decreased significantly since the onset of the latest period of civil unrest (Figure 3.6). Expressed in terms of cereal-equivalents (CE) to facilitate comparison of nutritional values, food crop production in 2005 was only about 62 percent of the pre-conflict level. When considered on a per capita basis, the decrease was even more dramatic—per capita food crop production in 2005 was only 45 percent of the 1993 level.

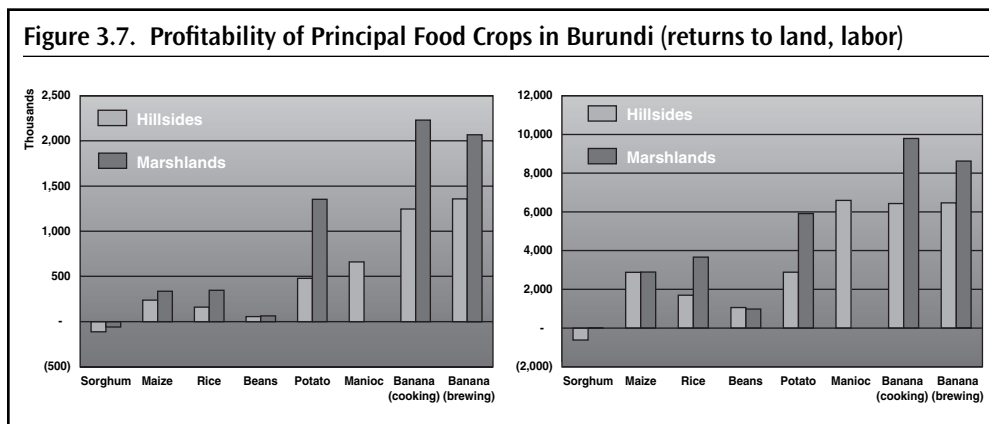
*Agricultural Inputs.* Data on the use of agricultural inputs are scarce. The withdrawal of the Government from the fertilizer sector has led to a fall in the use of fertilizer on all crops, including food crops. Adjusting for inflation, the price of fertilizer has roughly doubled during the past 10 years. Given the low purchasing power of most rural households and the high cost and limited availability of fertilizer in rural areas, fertilizer today is out of reach for many farmers. The little fertilizer that is used is applied mainly to cash crops, especially cotton and tea. Production and distribution of improved seed more or less ceased during the conflict. The production of foundation seed has partly recovered, but a severe shortage of capacity to multiply foundation seed means that commercial seed for most crops remains unavailable to farmers.

*Profitability.* The profitability of food crop production under alternative levels of management (traditional vs. improved) was analyzed in detail in the background paper on food crops (Figure 3.7). Banana is currently the most profitable crop, followed by potato, cassava, rice, maize, and beans. Analysis of the profitability of individual crops provides insights into farmer decisions, but it is risky to draw simplistic conclusions about likely crop choices because farmers determine their cropping rotations based on the complex interaction of many considerations, including production objectives, resource endowments, labor availability, risk, and uncertainty.

**Figure 3.6. Trends in Food Crop Production per Capita, 1990–2005**



*Storage.* Traditionally, most rural households in Burundi store food crops to ensure a food supply throughout the year. During the recent civil conflict, however, many households reduced the food stocks retained at home or even stopped storing food altogether for fear of losing it to combatants. Today, planting (and harvesting) activities are planned so that most food crops can be consumed



within a relatively brief period after the harvest. Storage—mostly cereals and beans—is undertaken mainly by traders, especially wholesalers in the major cities.

*Processing.* Most food crops are consumed with little or no processing. A limited amount of processing takes place mainly at the household level with the objective of improving consumption quality (hulling rice), enhancing storability (converting cassava into flour and starch), or adding value (brewing of banana and sorghum). Household-level processing using traditional methods is time consuming and tedious, however, and does not lead to a substantial increase in the storability of most crops. Industrial processing of food crops is almost totally non-existent at present following the total breakdown of the agro-processing sector during the conflict and the continuing absence of demand for processed products because purchasing power is limited.

*Marketing.* Food markets in Burundi are underdeveloped. Marketing chains for locally-produced food are informal and often fragmented, with produce typically changing hands several times as it moves from the farm gate to the final consumer. The length of the marketing chains depends on how perishable the products are. Most food crops are marketed at a very local level. Many local markets are dominated by a small number of relatively large traders who are organized into networks, wield significant market power, and dispose of important storage facilities. Most rural households pursue a subsistence strategy, so quantities of food crops that are marketed are modest (Figure 3.8). Small quantities of food crops may be marketed on an irregular basis in response to specific opportunities or be motivated by a need to generate cash. Farmers are poorly organized and tend to have limited bargaining power. They possess limited information on prices and market opportunities.

*Trade.* Food crops are actively traded between Burundi and its neighbors, but the precise quantities that cross the border are unknown because this trade is almost entirely unrecorded. Burundi currently has a structural food deficit, so it is safe to say that the country as a whole is a net food importer. Exports of food crops can be considered negligible. Judging from the difference between food demand (calculated as the notional consumption requirements of the national population) and food supply (domestic food produc-

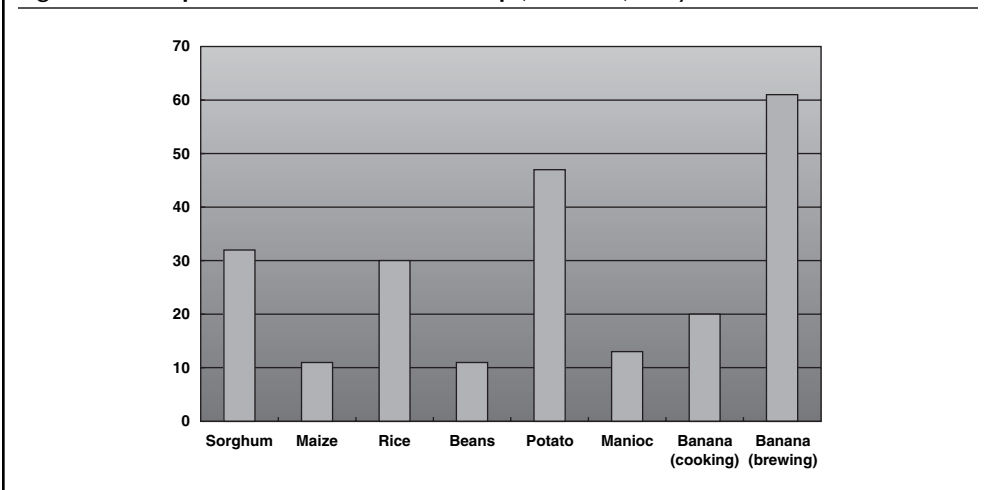
tion), the net national net food deficit after food aid has been provided is estimated, depending on the calculation method, to range between 100,000 and 350,000 tons of CE, which presumably is being covered through imports. Road traffic at the major crossing points suggests that this consists mainly of maize, beans, and rice from Uganda, Kenya, and Tanzania, as well as potatoes from Rwanda. Significant numbers of cattle also are walked into the country from Tanzania. The only food crops imported in substantial quantities from outside the region are wheat and rice.

### *Challenges Facing the Food Crop Subsector*

Growth in Burundi's food crop subsector is affected by a number of key constraints, all of which contribute to low profitability at both the farm level and the post-harvest level. Low profitability discourages investment in improved technology, which perpetuates low and stagnant productivity and prevents the subsector from evolving in dynamic fashion with the help of productivity-driven growth.

*Limited Use of Improved Management Practices.* Burundi's agricultural sector has considerable potential for growth, but its potential is not being realized. Productivity is low and stagnant. Farming systems are still predominantly subsistence-based and for the most part depend on the vagaries of the weather. The country's irrigation potential remains largely unexploited. Most rural households produce mainly food crops using traditional extensive cultivation methods, while commercial agriculture based on modern technologies and purchased inputs remains underdeveloped. The capacity of the agricultural research and extension systems has eroded in recent years, so even when improved technologies are available, they often they fail to reach farmers.

**Figure 3.8. Proportion of Marketed Food Crops, Burundi, Early 2000s**



*Limited Use of Purchased Inputs.* Deficiencies in input distribution systems limit the timely availability of improved seed, fertilizer, crop chemicals, and machinery. Where these inputs are available, farmers' ability to use them is often compromised by a lack of



credit because rural financial institutions are in general poorly developed. Inadequate supply of purchased inputs combined with weak demand is reflected in very limited use of these vital inputs. Less than 5 percent of the area planted to food crops is planted to improved varieties. Food crops receive an estimated 10–15 kg/ha of fertilizer on average, compared with optimal rates in the 250–300 kg/ha range. Use of crop chemicals is negligible on food crops.

*Uncertain Water Supply.* Burundi receives more rainfall than most other African countries, but the agricultural sector in Burundi suffers frequent disruptions caused by variable water supplies. Localized droughts are common, including some that last for several years at a time, and flooding in low-lying marshlands and catchment areas frequently decimates maturing crops. Crop losses caused by variable water supplies could be reduced with the help of irrigation, but the country's considerable irrigation potential remains largely unexploited. Less than 10 percent, or less than 5,000 hectares, of the country's potentially irrigable area is under irrigation.

*High Input Prices.* The low use of purchased inputs can be explained not only by their limited availability, but also by their high cost.

- Prices of purchased inputs (seed, fertilizer, crop chemicals) are high mainly because in the absence of local manufacturing capacity, these products must be imported. Transport and handling costs make up more than 50 percent of the final retail price of fertilizer, which is unusually high by global standards. In addition, procurement and distribution of fertilizer are characterized by economies of scale, but these are not captured because the domestic market is small.
- The price of land used for agriculture is also rising steadily in the face of increasing population pressure on an already overexploited resource. Formal land rental markets are relatively uncommon in Burundi so this cost is difficult to observe directly, but many rural households report that the time and effort (and informal payments) made to secure and maintain access to land continue to rise.
- The price of capital is high mainly because few formal credit programs target the agricultural sector. In cases where formal credit is available, it is almost always directed at cash crops—coffee, tea, palm oil, fruits, and vegetables. Lacking access to a formal credit sector, many households producing food crops finance their variable production costs by borrowing in the informal lending sector, where interest rates are extremely high.

*Low and Variable Output Prices.* While input prices may be high, prices received by farmers for their outputs are low and variable.

- Food crop producers in Burundi face a challenge in dealing with the country's underdeveloped marketing system. Most food crops are characterized by low value-to-weight ratios, making it unprofitable to transport them over large distances because transport costs quickly eat into profit margins. Producers therefore must sell their output in the immediate area where demand may be weak and unpredictable. The lack of long-term storage facilities for food crops combined in some

cases with their perishability means that many farmers are forced to sell during the post-harvest period when prices are at their lowest.

- The seasonality of food crop prices in Burundi appears to be unusually high by global standards. Food price variability is generally higher in rural areas because any available surpluses usually move to urban areas where demand is stronger and prices are higher. As a result, after harvest, prices in rural areas generally drop well below prices in urban areas, but during the pre-harvest ‘hungry season’ this relationship can reverse and prices in rural areas may rise above those in urban areas where residual food stocks remain.

*Post-harvest Constraints.* Factors contributing to low profitability at the post-harvest level in the food crop subsector include an unfavorable business environment, weak demand for processed foods, and unreliability in the supply of raw materials.

- *Unfavorable business environment.* Burundi’s unfavorable business environment undermines the profitability by raising the cost of doing business and jeopardizing the ability of entrepreneurs to capture returns from their investments.
- *Weak demand for processed foods.* The generally low income level of the population limits its effective purchasing power.
- *Unreliable raw materials.* To be profitable, food processing enterprises must be able to count on a reliable supply of high-quality raw materials, preferably at attractive and affordable prices. In Burundi, where food crop production is mainly rainfed and where markets are thin and underdeveloped, the availability and cost is highly variable.

Sector-specific factors contributing to low profitability at the post-harvest level include the limited availability and high cost of infrastructure-related services, inadequate financial services, and lack of human capacity and technical know-how.

- *High cost of infrastructure-related services.* The rural road network is poorly developed, making the assembly and movement of primary commodities and their transfer to centralized processing facilities expensive. The rural power grid has limited coverage, restricting the ability of food processors to locate facilities within production zones, and urban power grids are unreliable, leading to frequent disruptions affecting processing facilities located in urban areas. The country’s information and communications technology (ICT) capacity remains underdeveloped, with telephone charges high even by regional standards and internet coverage extremely limited.
- *Costly financial services.* Financial services available to agri-business firms are limited in number and costly in comparison to those offered in other sectors of the economy.
- *Lack of human capacity and technical know-how.* Not surprisingly, given the underdeveloped state of the food processing industry, there are few experienced entrepreneurs who possess the technical knowledge and business skills needed to launch and maintain viable agri-business enterprises.

### *Future Prospects for the Food Crop Subsector*

How is the strength and composition of demand for food crops likely to evolve in coming years, and what are the implications for Burundi's agricultural sector? Future demand will be shaped by three main factors: (a) population growth, (b) income gains, and (c) changes in consumer tastes and preferences. The population of Burundi is projected to grow at about 3 percent per year through 2015. Demand for food can be expected to grow at least at the same rate. Meanwhile, rising incomes will trigger shifts in the strength and composition of demand for food. As incomes rise, consumers can be expected to shift away from some root crops (sweet potato, cassava), coarse cereals (sorghum, maize), bananas, and beans into rice, wheat, and Irish potato. Consumption of fruits and vegetables will increase as well.

Separate from changes in food demand associated with population growth and income gains, the composition of demand is likely to evolve with changes in consumer tastes and preferences. The most important of these will be associated with urbanization as increasing numbers of people move from the countryside to towns and cities in search of employment. This demographic shift will fuel increased demand for convenience foods, especially wheat-based breads and pasta products, rice, and snack foods. At the same time, consumers will also become more concerned with quality, and consumption choices will increasingly be influenced by health and safety considerations, nutritional aspects, taste, and appearance.

What are the main forces that will affect the ability of the food crop subsector to respond to these projected changes in the strength and composition of demand? On the bright side, Burundi is endowed with favorable agro-climatic conditions—fertile and well-drained soils, abundant and widely distributed rainfall, and moderate temperatures—that permit production of a wide range of food crops. Given the small size of the country, rural production zones are generally located fairly close to urban consumption centers, leaving producers well placed to access markets.

Less positively, the shortage of agricultural land will only get worse as the population continues to grow, putting additional pressure on a critical resource that is already over-exploited. Although the land resource can be extended further by developing additional marshlands for irrigation, it is unrealistic to think that cropped area can be expanded by more than about 1 percent per year. In the case of food crops, planted area is likely to decrease as farmers shift into more profitable high-value crops such as fruits and vegetables, oilseeds, and industrial specialty crops. One notable exception is rice, which can generate attractive returns, especially when grown under irrigation using improved practices and optimal levels of fertilizer.

The continuing shortage of agricultural land means that future growth in food crop production must derive from intensification. Prospects for successful intensification of food crop systems appear bright given the extremely low current yields and the large scope for increasing yields through increased use of improved inputs (seed, fertilizer, crop chemicals) and more widespread adoption of improved crop, soil, and water management practices. Uptake of improved technology will have to be supported by strategic investments to improve the resource base on which agriculture depends (e.g., development of irrigation and drainage systems, terracing of hillsides, restoration of degraded lands).

How will the future evolution of demand for, and supply of, food crops in Burundi be affected by developments taking place outside the country? The fact that Burundi is land-locked with relatively poor links to external markets has both positive and negative impli-

cations for the food crop subsector. On the positive side, the country's geographical isolation, coupled with its predominantly mountainous terrain, confers a natural level of protection for Burundian producers in the domestic market because high transport costs make prices of imported commodities very high within the country. On the negative side, the same factors that confer natural protection to Burundian producers in domestic markets pose a major challenge to producers looking to sell in regional or global markets. The high cost of transporting Burundian commodities to regional or global markets must be absorbed in order for those commodities to be competitive outside the country.

The natural protection long enjoyed by Burundi's food crop subsector may soon be eroded. The Government has begun to foster greater regional integration, unilaterally reducing tariffs on many categories of imports, entering into the COMESA and EAC free trade zones, and adopting the common external tariff system of the EAC. These moves are expected to reduce the protection long enjoyed by the agricultural sector, although in the near term protection will continue for certain products deemed strategic (e.g., milk, maize, wheat and wheat flour, rice, tobacco, cotton). Over the longer term, the impacts of lower trade barriers are likely to differ by commodity group. The impacts are likely to be minimal for high-volume, low-value food staples, including roots and tubers and bananas, because these have always been traded informally, so they have rarely been subject to formal trade regulations. In contrast, the impacts could be significant for cereals (wheat, rice, maize) and beans, which are already imported in significant quantities from international markets outside the region and which tend to move in formal channels where they are subject to trade regulations.

Will food crop producers in Burundi be able to remain competitive in the face of increasingly open borders? Comparative advantage analysis undertaken as part of the SoRG study for rice, maize, wheat, and beans concluded that Burundian producers of these commodities will come under severe competitive pressure from producers in neighboring countries. The major difficulty that Burundi faces in competing with Tanzania, Uganda, and Kenya is that these countries have underused land that can be brought into production at relatively low cost. In contrast, if producers in Burundi are to remain competitive, they will have to lower unit production costs by raising productivity using intensified cropping systems, which will be challenging in view of the high cost of fertilizer and other imported inputs. Even if Burundi manages to pursue a successful intensification strategy, it is unlikely to remain competitive in the production of low-value cereals that can be produced at lower cost through extensive systems.

### *Priority Interventions Needed in the Food Crop Subsector*

The Government has set a target of sustained growth in agriculture of 6 percent. Based on the analysis carried out for the SoRG study, and recognizing the constraints identified above, the Government's immediate priorities should focus on both *sector-specific constraints* and *cross-cutting interventions*.

Rapid and sustainable growth in Burundi's food crop subsector can be achieved only if the productivity, profitability, and competitiveness of the subsector can be improved. The following interventions should be targeted for immediate attention.

*Strengthening Input Distribution Systems.* Sustainable intensification of Burundi's food crop subsector will not be possible without significant increases in the use by farmers

of purchased inputs, especially seed of improved varieties, chemical fertilizer, and crop protection chemicals including pesticides, herbicides, and fungicides. These inputs will not be available in a timely fashion and at affordable prices unless input markets are working well. Strengthening input supply systems therefore must be an important priority. Efforts to strengthen input distribution systems should focus initially on two areas.

*Seed and planting materials.* Private firms have limited incentives to invest in plant breeding research and seed multiplication for food crops, so public investment is justified. The Government should take the lead in revitalizing local plant breeding capacity, which in most cases should focus not on breeding new varieties but rather on importing and screening varieties developed outside the country. Government research stations should also assume responsibility for multiplying seed and planting materials and making them available to farmers at prices that farmers are willing and able to pay. Opportunities should be identified to cede selected activities to private firms (for example, production of hybrid seed).

*Fertilizer.* An urgent priority for the Government should be to stimulate the development of a viable fertilizer industry by strengthening demand and increasing supplies. Fertilizer is currently very expensive, not only because of the very high costs involved in importing small quantities, but also because the limited number of market participants concentrates market power. The Government should develop a national fertilizer strategy to encourage the emergence of a sustainable fertilizer distribution industry led by the private sector. During the initial stages of implementation, targeted support may be needed to assist fertilizer distributors and make fertilizer more accessible and more affordable to farmers. Support should not be provided through across-the-board subsidies designed to reduce the retail price of fertilizer, but rather in the form of “market-smart” subsidies targeted at key nodes in the market.

*Improving Soil and Water Conservation and Management.* Sustainable intensification of Burundi’s food crop subsector will not be possible without improvements to the natural resource base on which food crop production depends. In view of the current high rate of land degradation, accelerating soil fertility losses, limited area under irrigation, and low use of improved water management practices, there is an urgent need to scale up investment in the conservation and management of land and water resources. Efforts should focus initially in three areas.

*Soil conservation and management.* Improved soil conservation and management practices will slow and eventually reverse losses of soil and declines in soil fertility, for example, contour ridging, use of mulches and cover crops, use of green manure and organic manure, adoption of improved cropping rotations and associations, integration of cropping, and agro-forestry activities. On steeper hillside slopes where cultural practices may be inadequate for preventing soil losses, investment in terracing should be considered.

*Water conservation and management.* Practices that will slow and eventually reverse water losses include contour bunding and tied ridging, use of simple water diversion and retention structures such as check dams and mini-reservoirs, and use of water harvesting practices. Many of these practices are labor intensive, but relatively few require extensive capital investment, so most can be undertaken by farmers working singly or in groups, without the need for extensive public investment.

*Irrigation and drainage.* There is room for considerable expansion of irrigation in Burundi. Experience shows, however, that just because irrigation is technically feasible does not mean that it is economically profitable or institutionally sustainable. In under-

taking the development of Burundi's irrigation potential, investments in irrigation must be appropriately targeted in terms of location and scale. In addition, policies and procedures must ensure that water is managed efficiently and equitably, and officials, water user associations, and farmers trained to implement these policies and procedures effectively. A comprehensive national water policy must be enacted that can set overall priorities for irrigation development, coordinate the activities of the many players in the subsector, ensure a proper enabling environment, and address the provision of public goods and services needed for successful development.

*Reinforcing Technology Development and Transfer.* Technology-driven increases in productivity are needed to drive growth in Burundi's food crop subsector. Currently, improved technology is not being adopted at the farm level, resulting in stagnating yields of most major crops and low levels of profitability. While quite a lot of new technology can be imported from outside the country and adapted to local circumstances, for this to happen, the national research and extension systems will have to be reformed. Efforts should focus initially in two areas.

*Agricultural research.* Burundi's national agricultural research system is beginning to rebuild following the damage suffered during the recent civil conflict, but much remains to be done. Priority needs include not only rebuilding physical facilities, but also developing a cadre of trained researchers. Research on food crops is unlikely to attract private-sector investment, so the Government needs to make a long-term commitment to food crop research, and should move swiftly to develop a comprehensive long-term national agricultural research strategy. It will be particularly important to strike an appropriate balance between basic research and applied research. Given the small size of the country, basic research will often be difficult to justify, and the most cost-effective strategy will be to import and possibly modify technologies developed elsewhere in the region. Also important will be to ensure that food crop research remains demand driven, with demand defined not only in terms of the preferences of food crop producers, but also in terms of food crop marketers and final consumers.

*Agricultural extension.* An effective extension service is needed in Burundi not only to ensure transmission of knowledge and technology from the research system to farmers, but also to ensure that the needs of farmers and consumers are effectively channeled back to researchers. Although the Government has initiated steps to reestablish the former system under which responsibility for technology transfer was entrusted to local 'agricultural monitors,' if these monitors are to be effective, they will need significantly more training, operational support, and access to more information than they received in the past. Equally important, they will have to stop serving as conduits for top-down directives about what to plant and what practices to use and start acting as resources who can provide information and advice designed to empower farmers to make better decisions about their cropping activities. A major issue is how the agricultural extension service should be funded. While it may be possible to privatize the delivery of extension services for crops such as coffee and tea, continuing public support is likely to be needed in the food crop subsectors in the short run.

*Investing in Human Capital at the Farm Level and Beyond.* Adequate human capital must be in place to permit the emergence of a dynamic and vibrant food crop subsector. Capacity building efforts should focus on three areas.

*Reinforcing producer organizations.* Strong producer organizations will be needed if food crop production is to move away from its traditional subsistence orientation toward more a more market-oriented orientation. Achieving a successful transformation will depend on farmers' ability to identify actual and potential market opportunities, access cutting-edge technology, procure essential production inputs, produce high-quality products that meet the requirements of an increasingly quality-conscious market, and negotiate effectively with input suppliers as well as buyers. Efforts must be made to directly strengthen the technical skills of farmers (for example by establishing demonstration plots in all districts and through funding of learning events in the national agricultural show). Efforts must also be made to strengthen the institutional foundations of producer organizations by funding projects designed to launch farmer associations, producer cooperatives, and other communal bodies and equip them with the knowledge, resources (including financing), technical capabilities, and management skills needed to operate effectively.

*Creating a skillful and motivated labor force.* Skilled labor is a prerequisite for the adoption of new technology that leads to reduced labor costs, higher productivity, and increased competitiveness. While private firms can be expected to provide training in specialized technical skills needed for particular applications, the basic education of the work force will continue to be the responsibility of the State due to its public goods nature. Further efforts are needed to extend the reach of public education programs, especially increasing the number of girls, to improve the quality of instruction, widen the range of educational choices for students, including the addition of courses focusing on vocational skills.

*Creating a skilled managerial class.* Entrepreneurial and management skills are not widely developed in Burundi, in part due to the legacy of the past dominance by public and parastatal marketing organizations, as well as the past concentration of trade in unprocessed commodities. Programs are needed to provide training and technical assistance to strengthen business development skills that can help firms improve the quality of their processes, reduce costs, and expand operations.

*Building Local Capacity for Policy Analysis.* A dynamic and vibrant food crop subsector is unlikely to emerge in Burundi without continued support from the Government in the form of well conceived, properly designed, and effectively implemented agricultural sector policies. Such policies will not be forthcoming unless there is adequate capacity within the Government to carry out the solid empirically-based research on which sound policies must be grounded. Building local capacity for policy analysis will require interventions in two main areas.

*Analytical capacity.* The Government, with support from development partners, should move quickly to make the investments needed to reinforce the analytical capacity in the Ministry of Agriculture and other relevant public agencies and organizations. This will mean upgrading the skills of existing staff by providing in-service training, as well as attracting new staff with the skills needed to fill existing gaps. A related challenge will be to retain skilled staff by offering them adequate incentives, not only in the form of competitive salary and benefits, but also an attractive and stimulating working environment and the resources need to perform.

*Information and statistics.* Collection and reporting of agricultural statistics was severely disrupted during the civil conflict, thus policymakers find themselves in the

uncomfortable position of having to base decisions on an extremely limited set of information. Rebuilding statistical collection and reporting systems in the agricultural sector is urgent. The goal should be to move toward a system under which regular periodic agricultural censuses (conducted, for example, every five or 10 years) and regular annual agricultural surveys can be complemented by one-off targeted surveys implemented in response to specific topical issues.

*Cross-cutting Interventions.* In addition to sector-specific interventions, important actions are also needed to improve infrastructure services, access to finance, and the business climate. This section touches upon these cross-cutting constraints that will be further analyzed in Chapter 4.

*Investing in rural infrastructure.* Surveys of the business community consistently point to weak infrastructure as one of the most critical factors constraining growth.

- *Transport.* The most important intervention to develop the food crops subsector is strengthening rural roads to facilitate access to markets for inputs and outputs.
- *Energy.* Access to electricity is not a major problem for food crop production, which consumes very little power, but lack of, or an unreliable, electricity supply prevents development of food processing.
- *Information and communication technology.* Specialized radio broadcasts could be organized to serve the needs of food crop producers (such as market information, extension advice).

*Improving the delivery of financial services to the rural sector.* Many investments designed to enhance agricultural productivity—at both the farm level and the post-harvest level—depend on access to appropriate financial services. Strengthening rural financial systems is important for agriculture in Burundi.

*Improving the business climate* A final priority for government must be creation of a predictable and stable business climate that will allow individuals and firms to operate with certainty and confidence as they invest in productivity improvements, search new markets, and pursue activities that add value throughout the value chain.

## Livestock Subsector<sup>17</sup>

Animals are an important feature of the rural landscape in Burundi. Between 40 percent and 60 percent of the country's 1.2 million rural households own and raise livestock. Among these households, 10–20 percent raise cattle, 40–60 percent raise goats and/or sheep, 5–10 percent raise pigs, and about 25 percent raise poultry. Livestock production tends to be tightly linked to crop production, reflecting the emphasis in rural livelihood strategies on diversification and self-reliance. In addition to playing an important role as a source of income, food, and manure, livestock are also important for social reasons.

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17. The section was written by Michael Morris (Senior Economist, AFTS3) and Marc Moens (FAO).



Livestock production makes a significant contribution to the rural economy, but this contribution is not always recognized or appreciated because most livestock products are sold in local markets or consumed at home. The livestock subsector accounts for about 8 percent of total GDP and 17–23 percent of agricultural GDP. In terms of economic importance, livestock rank second behind food crops but ahead of cash crops. Within the livestock subsector, value-added activity is concentrated at the primary production end of the value chain. The livestock processing and marketing industries are relatively underdeveloped and account for only about one-third of value added.

Livestock production is a multi-functional activity that serves economic, financial, and social purposes. Animals, especially cattle, are valued for different reasons:

- *Income.* Most households that keep livestock earn income from the sale of milk, eggs, and occasionally meat. Sale of livestock products is generally not the main source of household income, but provides a regular source of that can supplement other more important income-earning activities. The fact that livestock products can be sold throughout the year means that the income buffers rural households against the seasonality in other sources of income.
- *Food.* Livestock are an important source of food for the households that own them. While most rural households consume milk and eggs on a regular basis, consumption of meat remains modest, and only about 5 percent of rural households consume meat weekly or more often.
- *Manure.* By generating manure that can be applied to cropped fields, livestock make an important contribution toward helping to maintain the productivity of cropping systems. Livestock can be fed a range of agricultural by-products (straw, hay, chaff, bran, peelings) that contribute to the overall sustainability of integrated crop-livestock systems.
- *Wealth.* In an economy where few rural households make use of formal financial services, including savings accounts, livestock serve as a convenient and highly liquid store of wealth. Savings accumulated by rural households are often invested in animals that are sold during times when cash is needed. Animals have the additional advantage of being highly mobile, which is important in an economy that has been characterized by civil conflict and in which rural households have frequently been displaced.
- *Social status.* Traditionally in Burundian society, animals—especially cattle—were an important symbol of social status. While this aspect of livestock ownership is perhaps less important today than in the past, ownership continues to confer prestige, and gifts of animals retain symbolic importance on certain social occasions, especially weddings.

Livestock production systems in Burundi can be distinguished according to type of animal and the intensity of production methods. At the household level, livestock ownership patterns are correlated with wealth, which in turn is often linked to land ownership and access. Poor households, to the extent that they own livestock at all, tend to favor small animals such as poultry, rabbits, and guinea pigs. Households of modest means keep the same species, along with goats, pigs, and sheep. The wealthiest 10–15 percent of households own cattle, generally in addition to the other species.

Livestock production methods depend very much on the availability of land. In rural areas where the population density is relatively low, cattle, goats, and sheep are raised using extensive production methods where they graze in open fields. In peri-urban and suburban areas where the population density is higher, these animals are raised using semi-intensive production methods, i.e., they are put out to graze for part of the day, but the rest of the time they are kept in stalls and given cut fodder, silage, and grain. Semi-intensive production methods are used by some progressive farmers even in rural areas where pasture is available. Farmers who use semi-intensive production methods are generally better integrated into the market system: they purchase fodder, manufactured feed, and other inputs (including veterinary products and services), and sell most of their production. The genetic characteristics of their animals also tend to be better. The most intensive production methods are used in and around urban areas where the population density is highest and pasture land has completely disappeared. Here, producers behave like small-scale entrepreneurs, using hired labor, purchasing all inputs, and selling virtually 100 percent of their production. These production systems mainly focus on dairy production, eggs, and fattening cattle and pigs.

Table 3.5 summarizes the characteristics of the most common livestock production systems found in Burundi.

### *Performance of the Livestock Subsector*

*Production and Productivity.* In the absence of a formal livestock census, reliable data on the size and composition of the national herd are lacking. But even if exact numbers are not available, the general trends are well known. During the recent period of civil conflict, populations of most major animal species—cattle, goats, sheep, pigs, and poultry—suffered precipitous declines as animals were killed and eaten, either by combatants or by displaced rural populations whose cropping activities had been interrupted. More recently, herds appear to have recovered strongly, and by 2005 numbers of most species had substantially grown and in some cases even surpassed 1999 levels (Figure 3.9).

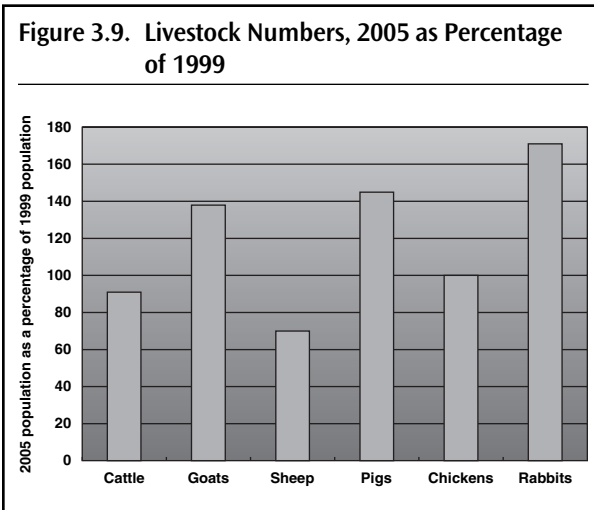
Official data on livestock production published by the Ministry of Agriculture and Livestock were reviewed and judged to be overly conservative due to the use of outdated parameters to estimate reproductive rates and milk and meat productivity. The official data were updated using more plausible parameters more in line with currently accepted industry norms (for details, see Moens 2007). The resulting adjusted livestock production figures are higher than those being reported by the Ministry. For example, while official production statistics indicate that 9,700 tonnes of meat and 16.5 million liters of milk were produced in 2005, the adjusted figures suggest that production was more likely around 16,000 tonnes of meat and 48 million liters of milk.

*Profitability.* As part of the background study prepared for SoRG on the livestock subsector, representative budgets were prepared for a number of common livestock production systems. With the help of these budgets, the profitability of the different livestock production systems was assessed and compared. Several alternative measures of profitability were calculated, including internal rate of return, annual net returns per reproductive female, and net returns per day of labor (Table 3.5). The profitability measures appearing in the last three columns of Table 3.5 provide different perspectives on the finan-

**Table 3.5. Characteristics of Livestock Production Systems Found in Burundi**

Species	Breed	Herd size (number)	Herd composition (%)	Productivity indicators			Profitability indicators			
				Meat (kg)	Milk (l/year)	Manure (tonnes)	Feed cost / total cost (%)	Annual net return (000 BIF)	Daily net return (BIF)	IRR (%)
Cattle		395,741					18	74	1,860	19
Extensive	Local race [Ankole]	178,083	45	32	149	0.4	19	131	2,631	29
Extensive	Crossbreed [Ankole × Sahiwal]	118,722	30	42	294	0.9	68	228	1,897	31
Integrated crop-livestock	Crossbreed 1/2 blood [Ankole × Sahiwal] × exotic	79,148	20	53	891	5.9	69	359	599	31
Semi-intensive dairy	Crossbreed ≥7/8 [Ankole × Sahiwal] × exotic	19,787	5	90	1,871	6.2				
Goats		1,245,680					0	11	2,223	67
Extensive	Local breeds	242,933	100	5.0		0.3				
Sheep		169,572					0	19	2,341	86
Extensive	Local breeds		100	10		0.4				
Pigs							39	128	3,895	75
Traditional	Local breeds	168,724	99.5	238		0.5	67	510	8,780	34
Semi-intensive	Improved breed [Local × imported]	0	0.0	702		1.7				
Intensive	Imported breed	848	0.5	1,691		3.8				
Rabbit								26	1,050	40
Extensive	Local breed	316,351	100	11		0.7				
Poultry		901,496					0	11	—	327
Traditional	Local breed	860,929	95.5	4.6	35	0.00	50	3.9	2,231	18
Domestic w/layers	Mixed breeds	9,015	1.0	0.7	104	0.03	69	4.1	4,817	25
Intensive w/layers	Imported breed type “layer”	31,552	3.5	0.7	128	0.03				

Source: Herd size (ISTEEBU). Productivity: calculations of the mission.



cial attractiveness of livestock production activities.

■ *Annual net returns per reproductive female* is the most relevant profitability measure from the perspective of most rural households in Burundi because they reflect what is often the limiting factor of production—capital. More intensive production systems are the most profitable according to this measure.

■ *Net returns per day of labor* is the profitability measure that will be of greatest relevance to households facing labor con-

straints. Extensive production systems are the most profitable according to this measure.

- *Internal rates of return are higher for enterprises* involving small ruminants, pigs, and poultry, and they are also higher among the more extensive production systems despite the generally low levels of productivity because initial investments and recurrent costs are low.

Sensitivity analysis revealed that the more intensive production systems generate returns that are much lower than their effective potential because producers use sub-optimal production practices. Sensitivity also revealed that extensive and intensive livestock production systems are characterized by different levels of risk. More intensive production systems that generate the highest internal rates of return tend also to be the most susceptible to changes in the quantities used and prices paid for purchased inputs.

*Feed Resources.* Burundi's livestock subsector faces a looming crisis in the form of a dwindling feed resource. Population growth has fueled an expansion in the area planted to crops that has been achieved mainly through conversion of pasture land. Between 1991 and 2002, pasture land decreased at an average annual rate of 6 percent. As a result, the so-called pastoral balance has been broken, and the amount of available pasture is now too small to support the nation's animal population through extensive grazing alone. The pressure being placed on the nation's land resource is reshaping the livestock subsector by altering the availability and cost of feed. Lacking sufficient high-quality pasture land to maintain their herds, livestock producers are reacting rationally by turning to intensive production methods. They are confining their animals to stalls and electing to grow fodder (only 5 percent as much land is needed to support a stall-fed animal than is needed to support an animal that is put out to pasture). The move toward intensification is also affecting the composition of the national herd. In recent years, many producers have started turning away from cattle (which require large amounts of high-quality feed) in favor of small ruminants (which consume less and lower quality feed).

Intensification of production practices will support continued growth in the livestock subsector, at least in the short to medium term, because it not only saves land but also allows a wider range of feed sources to be exploited. The supply side of the global feed balance can be significantly augmented through the addition of agricultural and agro-industrial by-products, forage derived from agro-forestry, and manufactured feeds. Calculations carried out as part of the background study suggest that if 30 percent of the agricultural and agro-industrial by-products available in the country can be directed into the feed chain for livestock, the nutritional requirements of the national livestock herd can be met. The resulting amount of nitrogenous digestible material, the most limiting factor, would be sufficient to feed about 80,000 additional genetically improved dairy cows (corresponding to annual milk production of 300 million liters).

*Marketing.* Livestock markets in Burundi, while relatively small, appear to be well organized and extremely dynamic. The dynamism appears to be attributable to the small size of the country, the fairly dense network of primary roads, and the small number of major livestock markets. More than two-thirds of all livestock transactions are concentrated in six major markets. The two most important markets, Cankuzo and Kayanza, are located close the border, which facilitates participation by foreign traders. The livestock marketing system in Burundi has two major channels:

- *Long marketing channels* deliver animals (mainly cattle, goats, pigs, and sheep) to the Bujumbura slaughterhouse. Four major wholesale markets are involved as intermediaries: Gitega, Matana, Rwibaga, and Ngozi.
- *Short marketing channels* dominate trade in milk, eggs, poultry, and rabbit meat. These products generally pass from the producer straight to the butcher-retailer who slaughters the animal and sells the meat to the final consumer.

The number of intermediaries, even in the long channels, is limited relative to the numbers found in most other countries. These intermediaries tend to be specialized in the products they carry. Relations among and between intermediaries tend to be traditional and informal, and because traders tend to do business with the same small set of business partners, newcomers face considerable barriers to entry.

The marketing system for skins and hides is distinct and specialized. Those of cattle, sheep, and goats are collected by individual tanneries from nearby livestock producers who are encouraged to deliver them to local collection centers. Hide and skin exports currently total approximately 400 tonnes per year, down from nearly 1,500 tonnes prior to the recent civil conflict. Over 90 percent of Burundi's hide and skin exports are low-value dry leather; less than 10 percent are higher-value wet blue leather. The leading destinations are Hong Kong, Pakistan, Kenya, and Italy.

*Slaughtering and Processing.* Burundi's slaughtering facilities are in need of upgrading and most slaughtering is done using traditional methods. Only three cities are equipped with modern slaughterhouses, which are publicly owned and operated because the law forbids private ownership of slaughterhouses. The public slaughterhouses are functional, but they are run-down and unhygienic. In the many parts of the country that lack slaughter-

houses, animals are slaughtered in the open, with little attention to hygiene standards. The sanitary risks are therefore very high.

Industrial processing of meat and milk is uncommon in Burundi. Aside from the slaughterhouses, a small number of ‘modern’ butchers, one tanning factory, and a handful of local dairies, there are no industrial processing facilities in the country. Because of the lack of processing capacity, most livestock products (meat and milk) must be sold quickly to avoid spoilage. This reduces the profitability of livestock production by restricting the ability of producers and traders to time sales to coincide with favorable market prices.

*Cross-border Trade.* Cross-border trade in livestock and livestock products is difficult to quantify because official trade data are scarce. The available data suggest a number of points:

- Imports of livestock and livestock products exceed exports by a wide margin.
- Milk imports are more important than meat imports. Milk imports are about 62 percent of all livestock imports, with live animals and meat as the remaining 38 percent.
- Official imports of meat are negligible, accounting for less than 2 percent of total meat supply from July 2005 to September 2006, the most recent period for which data are available.
- Very little milk or meat is exported. The only livestock product exported in significant quantities is skins and hides.

### *Challenges Facing the Livestock Subsector*

Growth in Burundi’s livestock subsector is being held back by five key constraints, all of which contribute to low productivity and low profitability.

*Poor Genetic Quality.* The animal resource base in Burundi is characterized by poor genetic quality. Use of genetically improved breeds is very limited, and improved animals are both hard to find and extremely expensive. There are no producers of genetically improved animals within the country, and the absence of direct flights from Europe makes importing animals cumbersome and expensive. A few companies have started to offer artificial insemination services, mainly for cattle, but these services are still costly and unreliable.

*Growing Shortages of Feed and Water.* Livestock producers in Burundi face a growing threat in the form of increasing shortages of high-quality feed. The amount of available pasture is now too small to support the nation’s cattle, goat, and sheep populations through extensive grazing, which is forcing producers of these three species to look for alternative feed sources. Competition for alternative feed sources is intensifying, however, which is driving up feed prices and eroding profitability throughout the livestock sector.

Livestock producers in Burundi also face increasing difficulty in accessing sufficient water for their animals. The dwindling availability of pasture is forcing many livestock producers to adopt intensive production methods, yet confining animals to stalls imposes an additional burden because water must be brought to the animals. Water is not always easily accessible, and considerable resources must often be invested in transporting water from distant sources.

*Animal Health Problems.* The livestock subsector in Burundi is plagued by widespread animal health problems. Disease is common among all species and mortality rates are high, resulting in significant economic losses and undermining profitability. High disease and mortality rates are caused by many factors, including the near absence of veterinarians in the country; the lack of legislation specific to veterinary activities; the limited availability, poor quality, and high cost of phytosanitary products; the lack of monitoring, control, and surveillance of pests and sanitary conditions all along the value chain; the use of overcrowded, outdated, and often unsanitary facilities for rearing, transporting, and marketing live animals; and the use of unhygienic slaughtering and processing facilities.

*Increasing Labor Requirements.* Intensification of livestock production systems will significantly increase labor requirements. For example, stall-raised cattle consume about 50–60 liters of water per day, which in many cases has to be hand carried from remote water sources. Carrying water is traditionally women’s work in Burundi, thus intensive livestock production could impose a heavy burden on women. Households facing cash constraints may not be able to acquire all of the needed purchased inputs, and those facing labor constraints may not be able to perform all of the activities associated with intensification.

*Bottlenecks in Processing and Marketing.* Bottlenecks in slaughtering and processing undermine the profitability of livestock production enterprises in Burundi by reducing the quantity and quality of marketed products. In the absence of modern, well-equipped slaughterhouses and dairy processing plants, animals are slaughtered under unhygienic conditions and sold quickly on the local market to avoid losses from spoilage, and milk is sold unprocessed. Producers generally have little or no opportunity to add value by processing their products into forms that can be targeted at specific market niches where they can command higher prices. They are rarely able to preserve products for extended periods in order to capitalize on favorable price movements in the market.

### *Future Prospects for the Livestock Subsector*

How is the strength and composition of demand for livestock products likely to evolve in coming years, and what are the implications for Burundi’s livestock subsector? Future demand for food in general will be shaped by three main factors: (a) population growth, (b) income gains, and (c) changes in consumer tastes and preferences. While the same three factors that will shape future demand for food in general will also shape future demand for livestock products in particular, it is important to note the importance for the livestock subsector of the second growth driver—income gains. Livestock products are superior goods with very high income demand elasticity, so income growth can be expected to stimulate much larger increases in demand for livestock products than for most other food categories.

What are the main forces that will affect the ability of the livestock subsector to respond to changes in the strength and composition of demand? The single most important factor will be increasing land scarcity—adding further pressure to intensify livestock production systems—which will mean reducing the number of animals and increasing their productivity through genetic improvement, improved nutrition, and improved veterinary care. Intensification may also be accompanied by a change in the composition of the national herd, with a shift away from cattle toward smaller species.

Intensification will also be accompanied by increased specialization as livestock producers will rely increasingly on dedicated feed producers. In order for this specialization to succeed, the subsector will become much more market oriented. The increasing specialization and commercialization will lead to the emergence of new economic opportunities for producers of feed and young animals (feeder calves, kid goats, chicks, piglets); providers of extension advice, veterinary services, and marketing assistance; and those offering specialized operations such as fattening and finishing.

The future competitiveness of Burundi's livestock will depend partly on developments in trade policies. The recent entry of Burundi into the EAC has exposed producers to increased competition from within the region, but has also provided some added protection from international (non-regional) competitors. This added protection could be particularly important for the dairy sector because many OECD countries produce chronic surpluses of dairy products (milk, butter, cheese) that are often dumped on global markets or distributed as food aid.

### *Priority Interventions Needed in the Livestock Subsector*

Enabling Burundi to reach the growth target of 6 percent in agriculture necessitates the following actions.

*Improving and Securing Feed and Water Resources.* Effective management of feed and water will be a major challenge because increased competition for these critical resources can be expected to intensify in the face of growing population pressure and dwindling availability of land. The government can play an important role by:

- Introducing, implementing, and effectively enforcing appropriate policies that promote efficient, equitable, and sustainable use of crop land and pasture land;
- Funding research to improve the productivity of pastures;
- Funding extension activities to ensure that improved technologies are efficiently transferred to producers; and
- Increasing the number of watering points for livestock.

*Promoting and Supporting Intensive Production Methods.* Unlocking growth in Burundi's livestock subsector will depend on the ability of livestock producers to shift from their current extensive production methods to more intensive production methods. The government can play an important role to support this transition by:

- *Increasing availability and affordability of genetically improved breeds.* Researchers have identified improved breeds that are well adapted to local conditions, but these breeds are not widely available, and when available they tend to be very expensive. The public sector has a role to play in supporting the production of improved breeds. These functions would not have to be performed directly by state agencies but could be contracted to private service providers.
- *Increasing availability and affordability of purchased inputs.* Public support is needed to encourage the emergence of vibrant and sustainable market-led input distribution systems. This support could include provision of enterprise management



training for distributors, provision of business and financial services, and provision of credit guarantees to input distributors. Government may also need to regulate the distribution of some inputs to ensure quality control.

- *Increasing availability and affordability of veterinary services.* Intensification will inevitably generate increased demand for veterinary services. Public support will be needed to ensure that these services are readily available, affordable, and safe. Government will need to regulate the distribution of phytosanitary products to ensure quality control.

*Improving the Processing and Marketing Stages in the Livestock Value Chain.* Burundi's livestock subsector will not be able to achieve its full growth potential if improvements at the primary production stage are not complemented by improvements further downstream in the value chain (processing and marketing). The government can play an important role in supporting these complementary improvements by:

- *Improving market access for livestock producers.* The ability of livestock producers to capture returns from their livestock enterprises is constrained by low rates of market participation. Improving market access will require investments in physical market facilities as well as transport-related infrastructure.
- *Improving market information systems for livestock.* Livestock producers have difficulty obtaining market information, which prevents them from targeting markets where prices are most favorable. Recent advances in information and communications technology (ICT) have dramatically lowered the cost of collecting, storing, and disseminating information, so this function could be undertaken by government at relatively low cost.
- *Upgrading slaughtering and processing facilities.* Investment is urgently needed in modern, efficient, and hygienic slaughtering and processing facilities to improve the quality and safety of meat and dairy products. In principle, these are activities that should attract private capital, particularly in urban areas where a strong and reliable demand for meat and dairy products is assured. In smaller towns and rural areas that are less able to attract private investment, community-owned facilities supported through payment of user fees would be an alternative.

*Reinforcing Institutional Support for the Livestock Subsector.* The DGE has suffered a severe decline in capacity and today is able to provide very few of the services that normally would be expected of an agency of such potential importance. Action is urgently needed on several fronts to rectify this situation.

- *Refocusing livestock research.* The focus of livestock research should be shifted to place greater emphasis on species other than cattle, and the scope should be broadened to include not only technical issues but also social, economic, and environmental issues. The research agenda should be more demand-driven to ensure that the needs of producers are being addressed, and it should be more closely linked to the extension service.
- *Rebuilding capacity for policy analysis.* The focus of livestock policy analysis must extend beyond the recurring topic of health regulations and embrace a much broader

agenda. Policy analysts need to interact much more extensively with industry participants to ensure that the policy research agenda is properly demand-driven and responsive to client needs.

- *Reinforcing livestock extension services.* Livestock extension services are in need of reinforcement, not only by hiring locally recruited ‘agricultural monitors,’ but also through deployment of properly trained and closely supervised technical specialists. Livestock extension activities should be much more demand-responsive than in the past, when they featured an inefficient top-down approach oriented around the delivery of packages of standard recommendations that often turned out to be inappropriate.
- *Improving delivery of veterinary and animal health care services.* Successful development of Burundi’s livestock subsector will not be possible without major improvements in veterinary and animal healthcare services. Provision of these services can often be privatized or entrusted to private-public partnerships, but a strong regulatory framework will be needed to ensure quality and safety.
- *Improving information and statistics.* A national livestock census is necessary to provide updated information about the numbers and types of animals, the characteristics of households that raise animals, prevailing types of livestock production systems, livestock marketing activities, livestock consumption patterns, etc.

*Cross-cutting Interventions.* The development of the livestock subsector would benefit from the same cross-cutting interventions that would enhance the food crop subsector.