Dairy and Poverty

Raising dairy cattle and processing dairy products provide a steady and important source of income. Dairy supplies high-quality protein and micronutrients generally lacking in cereal-based diets and is especially important for children and child-bearing women. This section highlights levels of milk production in different areas of Uganda and, in particular, shows areas where the amount of milk produced is estimated to be more than needed by the local population (see box below on calculating milk surplus and deficit). In these areas of apparent surplus, development strategies can aim at improving market infrastructure and reducing market transaction costs. In areas of apparent milk shortages, on the other hand, policymakers need to consider initiatives aimed at increasing production or improving market linkages to supply milk (for example by reducing transport costs through road construction). This information can also be used by dairy researchers and development agencies to better target knowledge dissemination and service delivery to dairy farmers.

The dairy sector contributes 40-50 percent of the livestock gross domestic product (GDP) (DDA, 2002), which in turn contributes 17-19 percent of the overall agricultural GDP in Uganda. Dairy is an important livelihood option for many rural Ugandans, and is a dynamic sector of the economy. Ugandans consume an average of 28 liters of milk per year, although this varies considerably across households and regions (Staal, 2004; Staal and Kaguongo, 2003). In general, the supply of milk in Uganda has not kept up with demand (Staal and Kaguongo, 2003).

Uganda's dairy production has changed considerably over the past 30 years. Before the 1980s, two contrasting systems produced all of the country's milk: large commercial dairy farms grazing exotic and crossbred dairy cattle on natural pastures, primarily in the wetter parts of southwest Uganda; and pastoralists raising large numbers of local cattle under traditional management systems, mostly in the drier eastern and northeastern parts of Uganda (Baltenweck et al., 2007).

Since the mid-1980s, a third production system—zero-grazing—was introduced. In such a system, farmers keep high-yielding, genetically improved cows (pure or crossbred with local cattle) in stalls, feeding the animals daily with fodder cut and carried to them. Development agencies promoted these more 'intensive' dairy systems and trained Ugandan farmers in managing dairy breeds and growing fodder. As a result, many smallholders bought exotic dairy cows or upgraded their indigenous stock by cross-breeding them with exotic breeds. Uganda's small farmers also varied their production approach, depending on resources and local conditions: some of them adopted strict zero-grazing practices while others combined grazing paddocks with stall feeding, a hybrid dairy production system that came to be known as 'semi-intensive' (Baltenweck et al., 2007).

Consequently, the number of improved dairy cows in Uganda has grown steadily since the 1980s and led to concomitant increases in national milk production, per capita milk consumption, smallholders' share in national milk production, and dairy's contribution to the national economy (Baltenweck et al., 2007).

POLICY SUPPORT TO THE DAIRY SECTOR

In 1992, the government launched a 'Milk Master Plan' to simultaneously improve rural incomes, farm living standards, national self-sufficiency in milk production, and yields of surplus milk for export. Milk market liberalization occurred in 1993 with the termination of the government's monopoly on milk processing. This resulted in the emergence of many medium and small-scale private milk processors. To realize the objectives of its 'Milk Master Plan,' Uganda established a Dairy Development Authority in 1998.

A recent study examined profits from, and environmental impacts of, stall-fed dairying (Baltenweck et al., 2007). The results show that Uganda's booming dairy farming is profitable regardless of the level of 'intensification' that farmers employ through use of feeds and other inputs. Even relatively small-scale, poor farmers can benefit from dairy; it is not just an activity for relatively wealthy households with lots of land. Another finding of the study was that all of Uganda's dairy farmers, whether intensive, semi-intensive or agro-pastoral, tended to underutilize their animal manure as organic fertilizer for crops. The study found soil quality on Uganda's mixed dairy-crop farms to be below a level considered critical for crop production, and that it was continuing to fall. This deteriorating situation is fast eroding the long-term sustainability of these farming systems, despite the fact that farmers have adequate amounts of manure from their dairy cows to fertilize the soil. The study suggested that the reason for underutilizing livestock manure as fertilizer was

the shortage of labor needed to save, transport, and apply the manure (Baltenweck et al., 2007).

MILK SURPLUS AND DEFICIT AREAS

Map 6 compares potential local milk supply and demand and shows clear patterns of net milk surplus and deficit. The map comes from an analysis using geographic information system (GIS) data coupled with national surveys (not local consumption data) (see box below on calculating milk surplus and deficit).

Areas in the west and south, and around Lake Victoria, particularly near Kampala and Jinja, are producing more milk than they can consume locally (areas of high surplus shown in shades of purple). The same is true for parishes in Nyadri, Arua, and Nebbi Districts in northwest Uganda. In the east of the country, however, there are major areas of apparent overall milk deficit (tan areas) mostly concentrated in parishes of Pallisa, Budaka, Mbale, Kaliro, and Kamuli Districts.

This map can help inform development strategies: dairy development actions in surplus areas could aim to improve market infrastructure and reduce market transaction costs, while those in milk deficit areas could target increased production and market linkages (Staal and Kaguongo, 2003). The map can also guide dairy research and development efforts to better direct knowledge dissemination and service delivery to dairy farmers.

CALCULATING MILK SURPLUS AND DEFICIT

Milk production is calculated by assessing the number and type of dairy cattle in an administrative area and then estimating liters of milk produced within that area based on average milk production per cow. Demand for milk is calculated by estimating the average milk consumption per person nationally and applying that number to the population density of each area. Areas with more milk produced than could theoretically be consumed by the population are considered 'surplus' areas, while those with more demand than can be met by current production are considered to be in 'deficit'. The study relied on data from 1999/2000 National Household Survey and the 2002 Population and Housing Census.

Source: Baltenweck et al., 2007.

MILK SURPLUS AND DEFICIT AREAS AND POVERTY

A milk surplus and deficit map can be compared with maps showing poverty rates and poverty densities in order to plan more pro-poor dairy interventions. Such overlays can, for example, pinpoint locations with multiple deprivations (e.g., high levels of poverty and a shortfall of milk) or with greater potential to reach a higher number of poor in an investment area. This section will highlight such examples.

Focusing on milk deficit areas (with shortfalls greater than 500 liters of milk per square kilometer per year) and overlaying them with poverty rates shows the following patterns in Map 7:

- Mid- to high poverty rates and high milk deficits are more widespread in eastern Uganda such as in Pallisa, Kumi, Budaka, and Kaliro Districts. These areas also have comparably high poverty densities (40-60 poor persons per square kilometer, as shown in Map 5).
- Low poverty rates with high milk deficits are scattered across the central and southwestern parts of the country. Many of these areas appear to be in locations that are more remote and further from big cities.

This brief comparison suggests that investment in dairy development efforts in the highlighted eastern parishes could potentially achieve two objectives: help move households out of poverty and improve local milk supply with nutritional benefits for poor households.

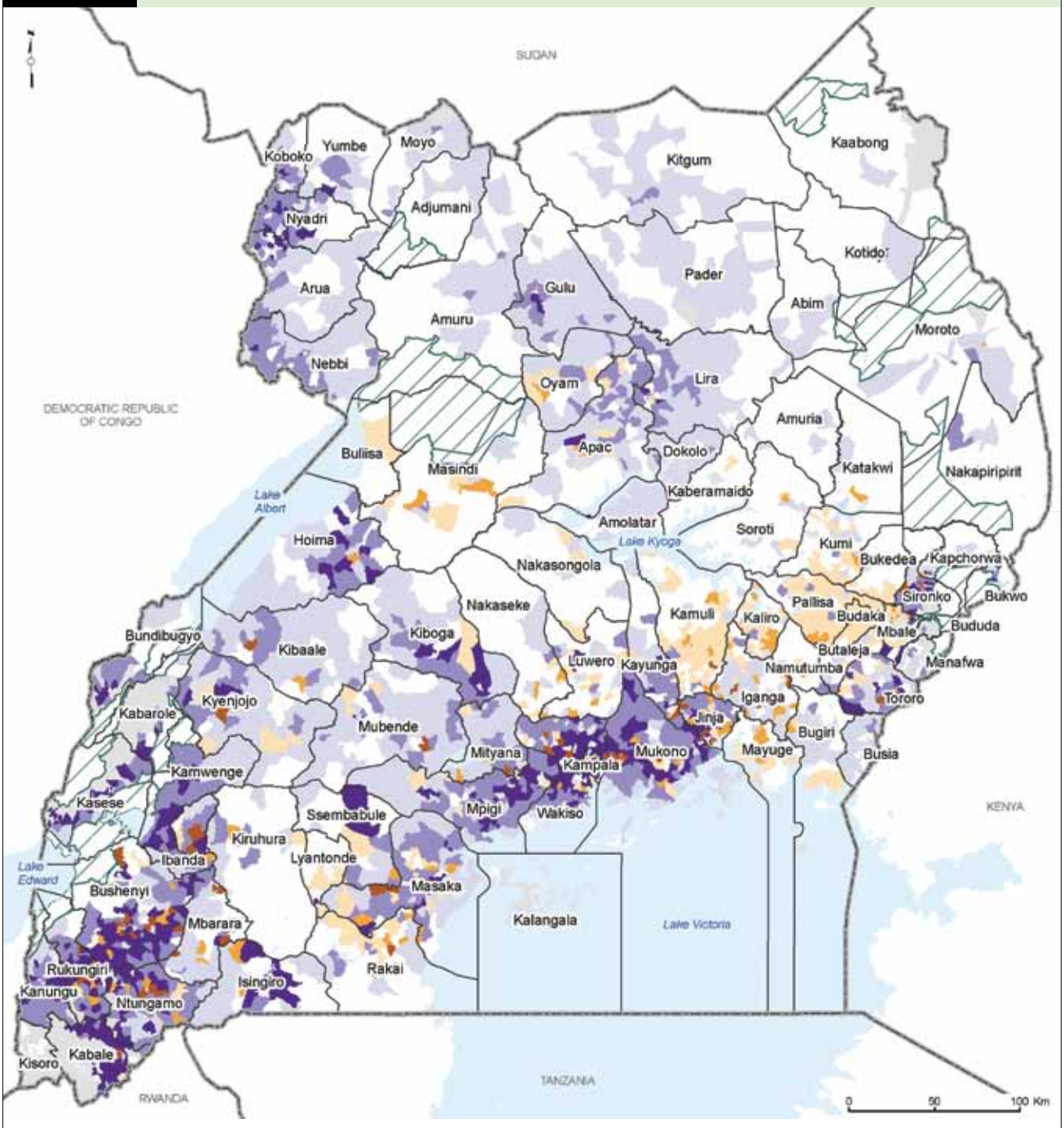
Map 8 looks at the high milk surplus areas (with a surplus greater than 3,000 liters of milk per square kilometer per year) in relation to poverty density. Most high milk surplus areas are in central and southwestern Uganda and almost all of them have lower poverty densities. Other milk surplus areas are in the northwest, eastern Uganda, and parts of Jinja District, but here poverty densities are much higher. All areas with high milk surplus and higher poverty densities also have medium to high poverty rates (as shown in Map 4). It is in these areas where value chain and marketing improvements could have the greatest pro-poor potential. While all surplus areas—those with low and those with high poverty densities—can benefit from these improvements, targeting poor households in areas with low poverty densities (and low poverty rates) has to be much more precise compared to an area with a high average number of poor per square kilometer (and high poverty rates).

DISCUSSION AND FUTURE ANALYSIS

The maps developed throughout this section illustrate how spatial analysis can inform efforts to improve planning for Uganda's dairy sector. Based on the data presented here, the following conclusions can be drawn:

- Both milk surplus and milk deficit areas include clusters of subcounties with high levels of poverty.
- These clusters are more concentrated in southeastern and northwestern Uganda.
- Subcounties with high poverty rates and a high total number of poor could be prime candidates for pro-poor targeting of future dairy investments and warrant a more detailed analysis of why such areas exist.

Map 6 POTENTIAL MILK SURPLUS AND DEFICIT BY PARISH, 2002



MILK SURPLUS OR DEFICIT
(liters of milk per sq. km per year)

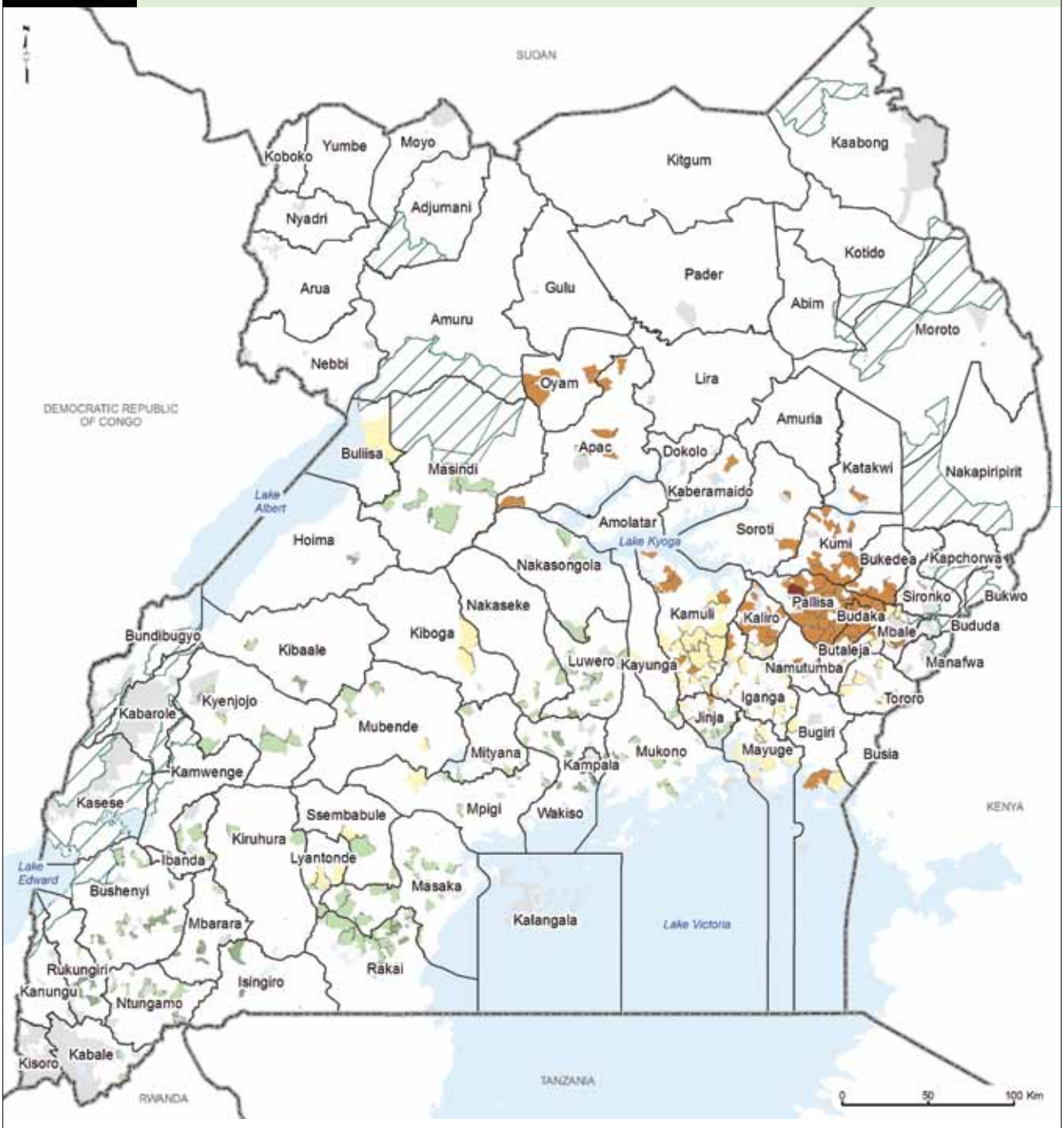
- Very high surplus (> 10,000)
- High surplus (3,000 to 10,000)
- Slight surplus (500 to 3,000)
- Supply close to demand (+ 500 to - 500)
- Slight deficit (500 to 3,000)
- High deficit (3,000 to 10,000)
- Very high deficit (> 10,000)
- No data

OTHER FEATURES

- District boundaries
- Major National Parks and Wildlife Reserves (over 50,000 ha)
- Water bodies

Sources: International boundaries (NIMA, 1997), district administrative boundaries (UBOS, 2006a), subcounty administrative boundaries (UBOS, 2002a), water bodies (NFA, 1996; NIMA, 1997; Brakenridge et al., 2006), and milk surplus or deficit (ILRI calculation based on IFPRI, 2002).

Map 7 POVERTY RATE BY SUBCOUNTY IN MILK DEFICIT AREAS



POVERTY RATE
(percent of the population below the poverty line)

- <= 15
- 15 - 30
- 30 - 40
- 40 - 60
- 40 - 60
- > 60
- Outside milk deficit areas
- No data

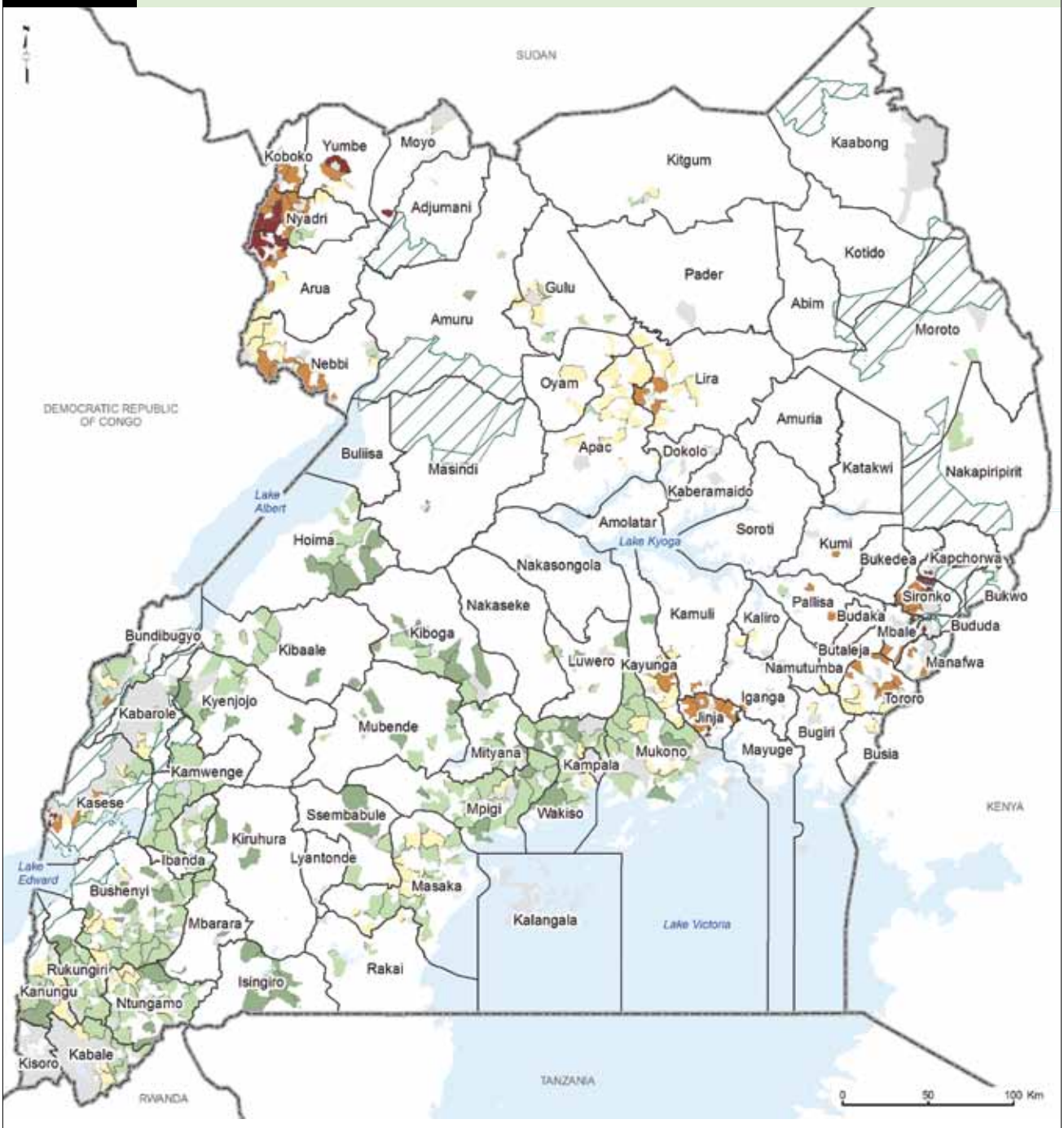
OTHER FEATURES

- District boundaries
- Subcounty boundaries
- Major National Parks and Wildlife Reserves (over 50,000 ha)
- Water bodies

Note: Milk deficit areas have a potential shortfall greater than 500 liters of milk per square kilometer per year (see Map 6).

Sources: International boundaries (NIMA, 1997), district administrative boundaries (UBOS, 2006a), subcounty administrative boundaries (UBOS, 2002a), water bodies (NFA, 1996; NIMA, 1997; Brakenridge et al., 2006), milk deficit (ILRI calculation based on IFPRI, 2002), and poverty rate (UBOS and ILRI, 2008).

Map 8 POVERTY DENSITY BY SUBCOUNTY IN HIGH MILK SURPLUS AREAS



POVERTY DENSITY
(number of poor people per sq. km)

- <= 20
- 20 - 50
- 50 - 100
- 100 - 200
- > 200
- Outside high milk surplus areas
- No data

OTHER FEATURES

- District boundaries
- Subcounty boundaries
- Major National Parks and Wildlife Reserves (over 50,000 ha)
- Water bodies

Note: Milk surplus areas have a potential surplus greater than 3,000 liters of milk per square kilometer per year (see Map 6).

Sources: International boundaries (NIMA, 1997), district administrative boundaries (UBOS, 2006a), subcounty administrative boundaries (UBOS, 2002a), water bodies (NFA, 1996; NIMA, 1997; Brakenridge et al., 2006), milk surplus (ILRI calculation based on IFPRI, 2002), and poverty density (UBOS and ILRI, 2008).

Box 6 A DAIRY DEVELOPMENT INITIATIVE BASED ON BUSINESS SERVICES DELIVERY HUBS

In 2008 Heifer International, in collaboration with four other organizations, launched the East Africa Dairy Development Project, which seeks to transform the lives of one million people in Kenya, Uganda, and Rwanda by doubling household dairy income over the next 10 years through integrated interventions in dairy production, market access, and knowledge application. The core project team is taking an innovative 'dairy value chain' approach that aims to expand opportunities for farmers, traders, transporters, processors, and consumers in these three countries. A key strategy of the project is to build the business skills of farmers within local 'business hubs,' where farmers' milk is bulked and cooled, and where they can access credit, training, knowledge, and inputs through farmer-owned enterprises.

In Uganda, the project initially planned to establish ten dairy hubs with chilling plants that support access to formal markets, along with another five hubs that develop an improved traditional market for milk sales. These dairy hubs serve as community anchors for industry knowledge, business services, and market access. When fully functioning, the dairy hub is a dynamic cluster of services and activities that generate greater income for farmers. By using this system, the quality of milk passing through the traditional market will be improved and access to formal markets will be facilitated through farmer owned-and-operated chilling plants.

Map 9 displays these dairy development hubs and a 20-kilometer 'buffer' zone. The circles (outlined in blue for ten hubs with chilling plants and in red for five traditional market hubs) approximate catchment areas from where the milk is expected to be supplied by local farmers. All hubs have a milk surplus when aggregated over their envisioned catchment area, and none is located in the high milk deficit areas shown in Map 6. This will ensure adequate deliveries of milk to the chilling plants.

Chilling plants store and cool (or chill) milk for pickup by commercial dairies or other market agents. They help to reduce milk spoilage and allow farmers to negotiate more competitive prices. Most of the areas with chilling plants shown in Map 9, for example, were dominated by smallholder farmers selling raw milk directly to consumers or vendors, resulting in low prices for farmers. The East African Dairy Development Project seeks to achieve broad market access for these farmers by supporting the formation of farmers' dairy groups and requiring dairy farmers to "literally buy-in to the dairy value chain through purchase and management of milk-chilling facilities." Over 280 registered farmer members in Masindi District, for example, raised one million Uganda Shilling (about $US 500) in share equity to invest in a chilling plant in 2008.

When selecting the geographic area for the initiative and determining the location of these hubs in Uganda, the project team relied on expert opinion to first prioritize districts and then select sites using a detailed checklist. Criteria included level of milk supply and seasonality, distance to demand centers, level of farm gate milk prices, access to water and electricity, and existence of farmers' groups among other factors. The experts did not geographically target poor areas explicitly—although by selecting areas with low farm gate milk prices, for example, they included locations with a large share of smallholder farmers with lower incomes. Map 9 shows the differences in poverty rates in the subcounties surrounding the dairy development hubs. Hubs in Nakasongola, Kiboga, Mpigi, Kayunga, and Jinja districts are located in communities with much higher poverty levels than the other ten hubs. Future evalu-

continued next page

This highlights other issues for research and follow-up analyses:

- Analysts working with the Ministry of Agriculture, Animal Industry and Fisheries, as well as local and national planning efforts can build upon the explorative analysis in this publication using the new data from the 2008 National Livestock Census on distribution of dairy cattle (including indigenous, exotic, and cross-bred species), average milk production, and milk prices.
- While the analysis in this section highlights only overlays of poverty with selected milk deficit and surplus areas, a more systematic analysis would be useful to understand spatial patterns of poverty with milk supply and demand.
- Raising dairy cattle successfully requires access to reasonably priced animal health and artificial insemination services. Thus, mapping access to veterinary services and artificial insemination services will be very useful for interventions aimed at livestock and dairy development.
- More detailed spatial data on existing milk collection, milk bulking centers including chilling plants (with information on capacity and level of functionality), and spatial mapping of economic variables such as farm gate milk prices could all help to identify locations where additional investment is needed and pinpoint which investments would be most beneficial.

MAP 9 DEVELOPMENT HUBS AND POVERTY RATE BY SUBCOUNTY

ECONOMIC DEVELOPMENT HUBS
- With chilling plant
- Without chilling plant

POVERTY RATE
(percent of the population below the poverty line)
- <= 15
- 15 - 30
- 30 - 40
- 40 - 60
- > 60
- No data

OTHER FEATURES
- District boundaries
- Subcounty boundaries
- Major National Parks and Wildlife Reserves (over 50,000 ha)
- Water bodies

Sources: International boundaries (NIMA, 1997), district administrative boundaries (UBOS, 2006a), subcounty administrative boundaries (UBOS, 2002a), water bodies (NFA, 1996; NIMA, 1997; Brakenridge et al., 2006), economic development hubs (ILRI, 2009), milk surplus (ILRI calculation based on IFPRI, 2002), and poverty density (UBOS and ILRI, 2008).

ations measuring the impacts of the hubs will have to take these poverty differences into consideration. They will also need to look at both the effects on the direct beneficiaries (members of the dairy farmers' groups) and other households in the community not directly participating in the project: How did improved market access affect the local milk supply and local milk prices, and did the effects differ for subcounties with higher poverty levels? In addition, lessons learned from the hubs with higher poverty rates may be instructive—for example what was the capacity of farmers to contribute equity for chilling plants—for future targeting of dairy interventions in Uganda's poorest subcounties.

Sources: Baltenweck, 2010; Heifer International, 2008; and EADD, 2008.