

## Business models for reducing greenhouse gas emissions from food loss and waste

### Reducing milk spoilage in Kenya could reduce food loss and emissions by 10.5%

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#### Value proposition

Satellite coolers and farmer training programs reduce the amount of time milk is exposed to high temperatures and unhygienic conditions. Coolers can potentially reduce losses during storage by 6%, while extension programs that introduce proper handling practices can reduce losses by 4.5%. Although these measures require significant investment, they pay for themselves so expenses can be shared among groups of farmers at the cooperative level.

#### Challenge

Most losses in the milk sub-sector in Kenya occur at the production and processing stages. Cooperatives collect milk from farmers – 70% of whom are smallholder farmers – at local collection centers. Milk is then transported to processing stations in sometimes unhygienic conditions, leading to spread of bacteria and eventually spoilage. Considering that the dairy sector is a significant source of GHG emissions (accounting for 20-41% of total emissions in Kenya) and that milk production is expected to more than double by 2030, wide-scale adoption of loss-reducing measures is vital for addressing climate change.

#### Financial and GHG analysis for coolers and training programs

Intervention	Costs	Financial returns	Reduced losses	Climate change mitigation potential (5.2 kg CO <sub>2</sub> e per liter of milk)
<b>Cooler</b> (5,000 liter capacity)	Per cooler: Purchase, installation: US\$ 5,942 Yearly operation: US\$ 8,318	Yearly profit: US\$ 18,029 5 year NPV: US\$ 49,571	Per cooler loss reduction: 52,560 liters/year	Marginal abatement cost: - US\$ 36 per tCO <sub>2</sub> e
<b>Farmer training program</b> (3-person teams)	Monthly operational costs: US\$ 1,090	Yearly profit: US\$ 9,480 2 year NPV: US\$ 4,369	Per extension services team: 65,610 liters/year	Marginal abatement cost: - US\$ 3 per tCO <sub>2</sub> e

#### Barriers to adoption

- Purchasing coolers and tankers requires significant upfront investments; however, farmers and farmer cooperatives in general have limited access to credit
- Poor infrastructure and difficulty in accessing markets limit farmers' ability to sell to processors
- Farmer cooperatives face significant challenges in financial management
- Processors do not have incentives to invest due to side-selling and competition from other processors

#### Solutions

- Provide business training to managers to increase bankability and improve access to credit
- Encourage banks lending to cooperatives, e.g. through credit guarantees or other risk-absorption measures
- Ensure that all informal milk production and processing meets quality standards (through pasteurization)
- Develop additional logistical solutions, such as installing coolers in mobile transportation (e.g. motorbikes) and encouraging use of smartphone applications to improve communication between farmers and cooperatives
- Improve understanding of cash flows among the various actors in the value chain and their incentives to invest in loss reduction in order to identify price or investment bottlenecks

### **Relevant actors**

Farmers, farmer cooperatives, Kenya Dairy Board, national and regional government, financial intermediaries, large processors, and extension workers

### **More information**

Please visit [CCAFS Invest](#) or contact Lini Wollenberg ([lini.wollenberg@uvm.edu](mailto:lini.wollenberg@uvm.edu)).

Duncan Gromko ([Duncan.gromko@unique-landuse.de](mailto:Duncan.gromko@unique-landuse.de)) from UNIQUE forestry and land use conducted the research in partnership with CCAFS. CCAFS is carried out with support from the CGIAR Trust Fund and through bilateral funding agreements. For details please visit: <https://ccafs.cgiar.org/donors>.

