



### Key Takeaways

- Loans were used to purchase improved breeds of cows, make improved sheds and other dairy-related productive assets and to invest in improved feed production and storage techniques.
- Farmers who chose to purchase higher yielding breeds, such as Friesian and Ayrshire, reported higher milk yields compared to traditional breeds (when quality feed was provided).
- Pilot farmers demonstrate their willingness to change their dairy management practices based on lessons learnt
- Improved fodder crops such as Lucerne, Desmodium, Caliandra and improved Napier grass have been widely adopted by farmers;
- Reductions in herd size coupled with increasing efficiency led to reducing greenhouse gas emissions per unit of milk produced
- Insurance successfully built into lending to dairy farmers.
- MFIs were able to leverage additional investments.
- Recommendations for scale up include ensuring farmers are grouped together appropriately, further investing in water storage, creating supplier loyalty to avoid side selling, building feed stores, furthering optimised feeding practices and breed selection, and advocacy around insurance cover for cows.
- In the dairy value chain, 1500 loans worth £1 million (FICCF £700k investment) were provided by microfinance institutions (MFIs) to smallholder dairy farmers in five counties by late 2017.

### Smallholder Dairy sector: key to commercial markets and reducing emissions

Smallholder dairy farmers comprised 80% of total dairy producers in Kenya and accounted for 56% of total milk production in the country in 2016.<sup>1</sup> Smallholders in the pilot areas are estimated to sell an average of 6.6 litres of milk per day according to the FICCF baseline. Zero grazing can result in higher milk yields of 15-30 litres/cow/day.<sup>2</sup> That level of productivity, taken together with other improved practices, can generate a gross margin of nearly \$5/day/cow.<sup>3</sup> However, actual gross margin per litre varies according to intensification, geographical location, production season and nature of milk sales.<sup>4</sup>

In Kenya, livestock production systems have been found to be net emitters of greenhouse gases. Conversely, livestock production is also impacted by climate variability. Emissions from livestock have been estimated to average from 4.5 t CO<sub>2</sub> eq/ha/yr in less intensive farms to 12.5 t CO<sub>2</sub> eq/ha/yr in high intensive farms<sup>5</sup>.

Within the farm GHG hotspots, methane (CH<sub>4</sub>) from enteric fermentation processes accounts for 26–39% of total farm GHG emissions whilst nitrous oxide (N<sub>2</sub>O) and CH<sub>4</sub> from manure management systems account for 26–38%. Improving manure storage can have a significant impact on reducing the CH<sub>4</sub> emissions.

The major opportunity being pursued

- 1 Smallholder dairy production in Kenya; a review, 2 July 2017
- 2 Kenya Dairy Farmers Training Manual, Department of Livestock 2012
- 3 KAVES: Smallholder Dairy Producers in Kenya Realize Higher Income from Better Feeding Practices, June 18, 2015
- 4 Smallholder dairy production in Kenya; a review, 2 July 2017
- 5 Ortiz-Gonzalo D, Vaast P, Oelofse M, de Neergard A, Albrecht A, Rosenstock TS. 2017. Farm-scale greenhouse gas balances, hotspots and uncertainties in smallholder crop-livestock systems in Central Kenya. Agriculture, Ecosystems and Environment 248:58-70.

under the FICCF smallholder dairy is to improve productivity per cow in order to reduce methane emissions per litre of milk. This is achieved by investing in more productive cows (lowering the ratio of herd size to milk yield), improving herd health and feed quality which also contribute to improving milk quality and supply.

The pilot also builds resilience of dairy farmers to climate and economic shocks by encouraging the production and storage of animal feed which means they can still feed their herd in times of drought.

Other interventions include farmyard manure management to increase soil fertility, biogas production for household use, reducing milk losses in the supply chain and value addition.

This brief summarises the dairy pilot achievements and impacts between January 2015 and June 2017.

### Dairy supply chain partnerships

The dairy pilot has been operating in central Kenya and the mid-rift regions (Nyandarua, Bomet, Embu and Meru counties FICCF supported two MFIs, ECLOF Bank and Inuka Africa, by providing “seed capital” to kick-start the on-lending model in the dairy value chain aimed at increasing financial inclusion and stimulating investment in climate-smart strategies. The FICCF loan portfolio with MFIs operates as a revolving fund where repayments are then lent onwards to new and existing customers.

By late 2017, 1500 loans worth £1m (FICCF £700k investment) were used to purchase 664 cows (improved breeds), invest in improved feed production, improved storage and sheds, and other dairy-related assets.

Over the pilot term, both MFIs entered into commercial partnerships with a range of dairy cooperatives and dairy enterprises, each of which had working relationships with dairy farmers. Farmers took loans at commercial rates (between 12 and 15%) . The loans to

### Average loan purpose by value

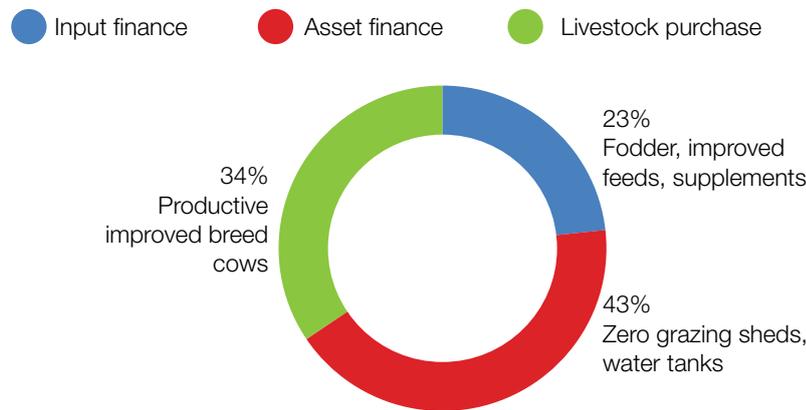


Figure 1: Average loan purpose by value, INUKA figures Q2, Q3, Q4 2016 (FICCF data)

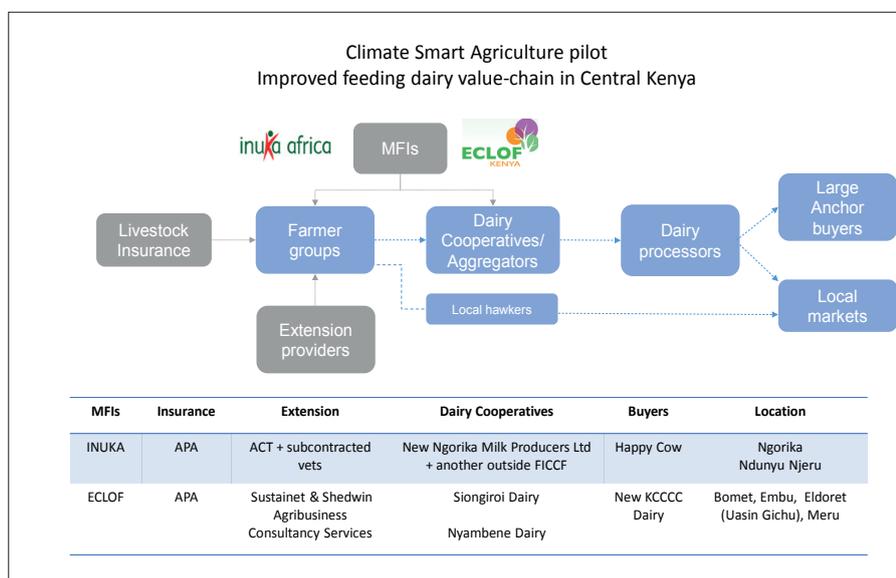


Figure 2: The CSA pilot dairy value chain in Central Kenya (Source: DAI)

the farmers are used as investments to purchase better dairy cows, construct pens, production of better feed and construction of feed storage.

A technical support grant providing seasonal agro-weather advisories and complementary technical CSA services ran in conjunction with the loan program provided by local competent service providers

### ECLOF partnership

ECLOF partnered with Superior Highlands Dairy and Siongiroi Dairy Plant Ltd in Embu and Bomet respectively. The main end buyer was New KCCCC Dairy. ECLOF lent at 15% to purchase cows, construct cowsheds and establish productive feedstocks. Loan funds were dispersed in cash, paid direct by

ECLOF for assets such as cows or in cases where the aggregator had a shop to supply farm inputs, the money was paid to the aggregator and the farmer purchased inputs through a “check off” system. Loan repayments were remitted by the dairy direct to ECLOF based on the farmers’ milk delivery each month.

### Inuka Africa partnership

Inuka Africa worked initially with New Ngorika Milk Production Ltd and then expanded to other dairies (outside the FICCF pilot) and then to direct lending to farmers. INUKA lent finance to farmers at 12-15% interest rates. The collateral for loans for both ECLOF and Inuka Africa is the cow as well as the milk delivery records held by the dairies.

## Dairy climate information services

### Dairy index development

Under the climate information services component of the pilot, FICCF contracted ACRE Africa Ltd to help define the relationship between milk production and weather, with a view to developing a weather index for dairy. However, this component was constrained by data scarcity and will require more time and data to develop an index product.

### Dairy advisory content development

Climate information is helpful to dairy farmers for understanding the links between climate and disease prevalence, fodder production and milk yield. FICCF contracted ACRE Africa to provide this service through development and dissemination of downscaled agro-weather advisories to contracted dairy farmers. ACRE installed three Automated Weather stations in Ngorika to monitor local climate and generate data for the development of the advisories and for validation of the communicated information.

ACRE issued advisory messages via SMS to participating farmers relating to weather forecast data (precipitation, temperature and humidity). The messages were designed to help farmers interpret weather forecasts to manage risks related to fodder, forage, milk production and livestock diseases.

## Pilot performance and impacts

### Value Chain relationships

#### Inclusive finance and impacts on productivity

- The demand for loans in the dairy sector from both ECLOF and Inuka was high and loan repayment performed well. Re-paid loans were re-lent and as a result the MFI portfolio has grown over time.
- Good farmer-aggregator relationships are a critical aspect of the dairy sector relationship – dairies have records of milk delivery over a number of years and are able to provide evidence to support loans to farmers.

- Need for day-to-day liquidity can force some farmers to sell to brokers who pay cash even when the aggregator price is the better option. The aggregator pays monthly and normally only after they have been paid by the end buyer.
- Prior to the FICCF lending, many banks were unresponsive to small-holder farmer needs to access funds.
- The back-to-back drought incidences of 2016-2017 impacted dairy farmers across Kenya and in some FICCF cases, milk delivery dropped to a point of loan default. E.g. severe impacts on parts of Bomet County resulted in high loan arrears for farmers who had borrowed from ECLOF and resulted in few new or repeat loans being issued.
- Where lending was based on the group model, default by one farmer meant that other farmers were unable to take loans or repeat loans even if their milk delivery was performing well.

### Impacts of technical services

Training and technical assistance to farmers led to increased stability of milk production as a result of better feeding, and smoothed milk production through the dry period by sustaining milk production throughout the lactation period (Figure 3). Farmers adopting improved feed production techniques reported less dramatic reductions in milk production than in previous droughts.

- Farmers who had previously not engaged in fodder production are now engaging and expanding feed production.
- Siongiroi Dairy has acquired a pH dipper for soil testing and are collaborating with Soil Care to test soil samples with their mobile lab.
- Farmers are also staggering the lactation periods of their cows to maintain incomes over a longer period.

### Impacts of climate information services (CIS)

- CIS worked well but drought in the pilot period impacted production levels
- The limited historical data on milk production and prevalence of diseases in dairy herds has

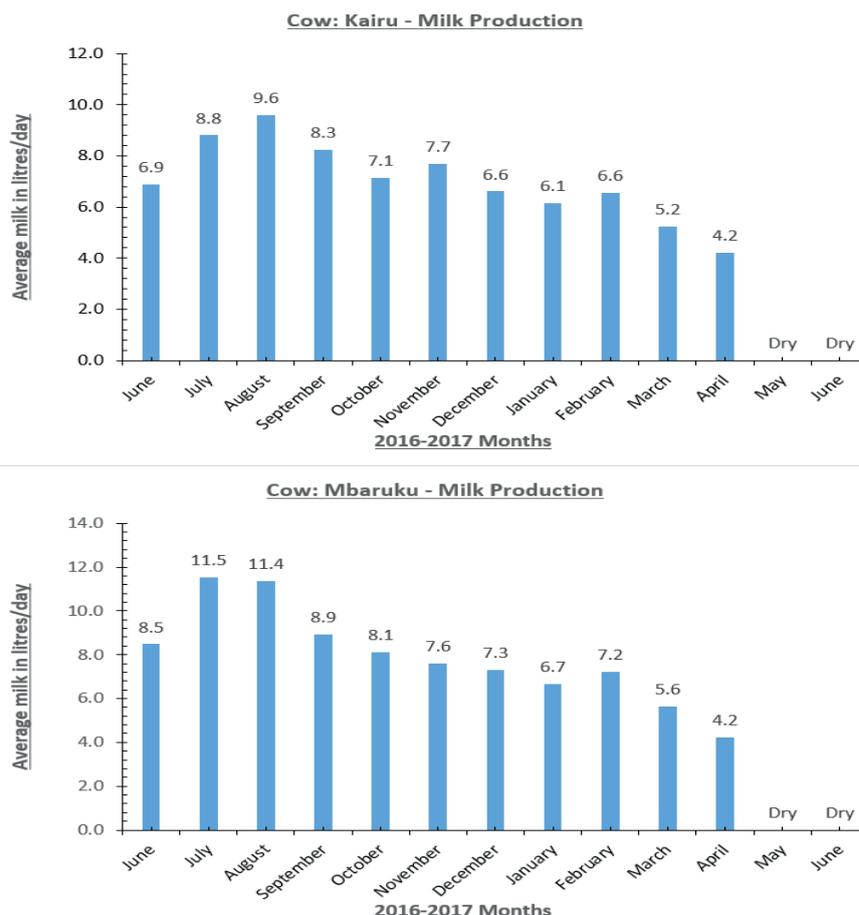


Figure 3: Milk production trends for Ngorika

constrained ACRE's efforts to establish relationships between weather and the dairy sector and constrain efforts to establish an index insurance product for dairy at this point.

- The Smart Cow application which Inuka has now adopted provides a useful mechanism by which farmers can be encouraged to maintain management records for the dairy enterprise.

### Impacts of livestock insurance

- Limited information disclosure by the insurer and unwarranted delays contributed to unsuccessful claims.
- Farmers buying cows using FICCF loan finance, had indemnity insurance in-built in the purchase process;
- Both ECLOF and Inuka have cases where cow mortality claims have been successfully processed and farmers compensated for their loss.

- While uptake of the insurance package was good, the process of assessing claims was slow in many cases and not amenable to quick execution during the short project timeline.

- Challenges experienced with the dairy insurance included limited information disclosure by the insurer, insufficient training at the outset to ensure claim procedures were clear and in place. The cost of fitting each animal with a unique traceable device (a bolus or a microchip) should be incorporated into the cost of insuring each animal to reduce potential for fraud.

### Resilience building

- Varieties of legumes and grasses more adapted to drought, soils type and which can be grown with irrigation need to be identified.
- Better water management with solar pumps, shallow wells, dams and water harvesting twinned with zero grazing shed roofs need to be explored further.



- Farmers and dairies can further reduce GHG emissions per litre of milk through zero grazing systems and improved fodder.
- The used of cow manure as a fertiliser for fodder crop production needs to be increased and there is scope for further uptake of biogas linked to zero grazing sheds.
- Selecting appropriate lead farmers to act as demonstration farms worked well as a useful model for farmer-to-farmer learning.
- Where dairies have extension agents on staff, developing their technical capacity on applicable CSA techniques adds to the sustainability of the model;
- ICT platforms such as the “Smart Cow” app can be utilised to benefit dairy management, CIS and insurance.
- The role of the FICCF team as a coordinator for the partnerships contributed to the cohesion of the process and provided an independent mediator to help resolve challenges as they emerged.

## Key lessons

### Successes

- Considerable interest in availing of loans to improve on-farm dairy enterprises was seen and most farmers successfully repaid loans;
- The close link between availability of technical assistance and lending to dairy is a new aspect that has contributed to the farmer’s capacity to borrow and enabled the MFI to streamline and offer more products to the farmers.
- Insurance was inbuilt into the lending and where animal deaths have occurred the insurance companies have processed claims;
- Local weather data for Ngorika area and the communication of weather advisories by sms demonstrated how climate information services can contribute to the sustainability of local dairy operations.
- Both ECLOF and Inuka have demonstrated that lending to small holder dairy farmers is a viable business model.

### Challenges

The challenges included:

- The short timeframe of 24 month at the outset of the pilot was short to realise impacts. A longer term process is required to build the capacity of all the stakeholders (MFIs, aggregators, farmers, technical services providers) to the pilot aspects
- Fluctuating milk prices which resulted in cash flow challenges for small dairies.
- Lack of local extension services at the county level has been restrictive though the opportunity for dairies to develop in-house capacity in this respect exists
- Severe weather variation experienced during the pilot impacted pilot activities
- Transitioning to zero grazing requires investment in appropriate dairy housing structures

## Potential for going to scale

The pilot has shown that there are actions that will help to unlock the future of dairy as a climate-smart value chain. These include steps to:

- Ensure accurate data collection is an essential step in scaling up dairy production and applications such as “Smart Cow” which has been developed in Kenya offer mechanisms to collect large quantities of data ;
- Increase fodder production and storage to increase resilience;
- When working with farmer groups, ensure that the groups are constituted of like-minded active farmers who will be motivated to support each other with new technologies and to share new knowledge;
- Increase the capacity to harvest and store water as weather variability is likely to increase further;
- Sensitize farmers on insurance uptake and ensure that proper systems are in place for submitting and processing claims.
- Develop in house capacity in dairies to provide cost effective extension services to suppliers
- Scale up feed production and storage capacity.