

Improving Livelihoods in Morocco: Needs Assessment of Small-Scale Cattle Farmers



D-BRIEF from MIT D-Lab Scale-Ups – Fall 2014

RESEARCH OBJECTIVES

Gain a comprehensive understanding of how cattle raising practices affect the income and profitability of small-scale farmers in Morocco

Identify farmer's constraints related to providing quality, year-round cattle feed

Recommend an appropriate course of action to improve cattle nutrition and farm profitability

Identify and engage key stakeholders for the next phase of this project and additional research engagements

Increasing milk-production & farmer income through rain-fed silage

In the summer of 2014, D-Lab carried out an in-depth study to characterize and assess the small-scale dairy and beef production system in Morocco as it affects the livelihoods of the rural population. This assessment built upon and verified the findings of a preliminary study carried out by D-Lab a year earlier, which identified the high cost of animal feed as a major constraint for Moroccan smallholder farmers.

Working in and around Tifelt, situated 65 kilometers east of Rabat, the D-Lab team selected and interviewed small-scale farmers about their cropping and livestock management practices. This D-Brief summarizes a 73 page report that includes a market analysis of the dairy sector in the Tifelt region, a stakeholder analysis, and a value chain analysis of the dairy and beef production systems, as well as a bio-economic model that evaluates the nutritional and economic impact of potential solutions.



Tifelt-area dairy farmer with her grandson and D-Lab research associate Belinda Richardson.

Key recommendations

Production of rain-fed cereal crop silage is proposed as a promising intervention to decrease cattle feed costs and increase revenues for small-scale cattle farmers in the Tifelt region of Morocco, as well as improve cattle nutrition and milk production.

The technology and knowledge needed to produce triticale silage already exist in Morocco and silage trials are already underway in other parts of the country. However, successful implementation of this intervention will require several key factors including:

- Participatory engagement process that fosters farmer cooperation and ensures alignment of interests and fair distribution of gains along the supply chain
- Capacity building: training and technical assistance on the benefits of silage and how to produce silage
- Formulation of farmer incentives for milk production
- Access to financing to pay for silage equipment

Methods & Study Design

Semi-structured interviews with small-scale farmers and other stakeholders were used to collect information about farmers' needs and develop a detailed description of the milk and cattle value chain.

A total of 43 farmers and 20 other key informants were interviewed during the course of this study. Thirteen farmers were interviewed in January to gain an initial understanding of the market and establish a segmentation of the population.

In June, 28 farmers were screened to identify those who would be appropriate for more in-depth interviews. Twenty farmers were then selected for longer interviews in July to complete a detailed analysis of their cropping, feeding, milk production and calving practices.

The interviews were exploratory in nature and took 30 to 120 minutes depending on the phase of the study and the farmer. Many of the farmers were interviewed more than once.

The data and information collected from farmers provided a rich information and compelling evidence about the needs of this segment of farmers in the Tifelt region. Through key informant interviews, these needs were verified to be typical for this region as well as for other regions in the country. This need was also confirmed through extensive secondary research on the agriculture sector in Morocco.

Small-Scale Cattle Farms & the Dairy Supply Chain

There are approximately 700,000 small-scale cattle farms in Morocco practicing a mixed milk and beef production with five or fewer cows. The typical small-scale dairy farm is a family operation growing rain-fed grain crops on less than three hectares of land. The family raises three dairy cows and their progeny, averaging one bull calf sale per year and 3,000 liters of milk per year, mostly sold to collection centers for the milk processing industry.

Although there are a few large dairy producers, the milk supply in Morocco is still largely dependent on small-scale farm production. The milk value chain is characterized by a highly fragmented milk collection system, a pronounced seasonal variation in milk production, and the seasonal availability of cattle feed.

Industrial processors, including private businesses and cooperatives, handle at least 60 percent of milk produced. The remaining milk finds its way to consumers through a traditional distribution channel called *malabates* or is retained by farmers for household members and calves. Milk sold through *mahlabates* is unregulated - and illegal - and so the volume of milk sold through this channel is difficult to estimate.



Tank at a rural milk cooperative being emptied into a tank truck on the way to a regional processor.

Cattle Feed Practices

The survey of the 20 small-scale dairy farms revealed that milk production is highly constrained by weather seasonality and the cost of purchased feed.

Small-scale dairy farmers practice two distinct feeding regimes throughout the year. When crop is abundant, cattle receive a fairly balanced and sufficient ration made of green crop and fodder grazing, complemented with straw and purchased concentrates. During the crop scarcity season, which extends over eight months, farmers mostly rely on straw, and purchased feed concentrates, complemented with any grains they have grown on their farm.

This dry diet is less than optimal for milk production. Not only are the available quantities of energy and protein insufficient for optimal milk production, but the digestion process is further inhibited by lack of green inputs resulting in poor conversion of nutrients into milk. Thus, the farmers are using feed inefficiently to keep their cows alive during much of the year.

Dairy Farm Revenues

The average small-scale dairy farm profits are generally modest. Because milk sales barely cover the cost of milk production, there is an incentive to raise calves at the expense of investing in milk production. However modest, milk revenues provide some daily cash flow while calves serve as a household savings account.

The economic analysis of farm revenue and expenditures shows that profitability is most sensitive to the cost of feed and to the number of calves sold. Not surprisingly, farmers tend to carry as many cows as possible even though fewer, better fed cows would produce more milk more efficiently. This is counterproductive, as higher animal loads mean less nutrition for the cattle, jeopardizing both milk and beef revenues in the longer term.

Recommendation: Rain-Fed Silage

To generate recommendations, the data gathered through the interviews were analyzed using a bio-economic model (derived from “Integrated crop-livestock Simulation Models for Scenario Analysis and Impact Assessment,” Thornton and Herrero, 2001), which evaluates the nutritional and economic impact of potential solutions. Based on the results of this theoretical simulation, the ecological and social context of the region, and initial interest expressed by multiple stakeholders, a rain-fed triticale silage intervention was deemed feasible and worth exploring. Triticale is a cereal crop that is a hybrid of wheat and rye and is well-suited to local conditions. This silage intervention seeks to improve cattle nutrition, reduce costs and increase revenues for the farmers.

The results of the bio-economic model with the triticale silage simulation showed a significant increase in cattle nutrition during the scarcity season, translating into increased milk production and, more importantly, increased profitability through the reduction of costs and an increase in revenues. The model also demonstrated that the income of the farmers has the potential to smooth over the year, decreasing some of the effects of seasonality and stabilizing cash flow throughout the year.

The technology and knowledge needed to produce triticale silage exist in Morocco and triticale silage trials are already underway in other parts of Morocco. However, there are a variety of factors that will contribute to the overall success of the intervention. To establish triticale silage, small-scale dairy farmers need to procure silage bags and hire equipment. To pay for these additional expenses, access to financing will be necessary through micro-credit or cooperatives.



Translator Youssef Khalfaoui and a dairy farmer visit cows in his barn.

An appropriate educational campaign will also be necessary to explain and demonstrate the benefits of silage as well as train the farmers on triticale cropping, harvesting practices, and proper storage for optimal preservation.

It will be challenging to effectively encourage farmers to embrace and adopt new farming practices. This will require investment in a participatory engagement process that fosters farmer cooperation and ensures alignment of interests and fair distribution of gains along the supply chain.

Finally, farmers will need to be incentivized to produce milk. As silage is introduced and the milk production potential of well-fed cows starts to be apparent, it will be important to emphasize and communicate the effect this has on farm profits.

With these factors in place, skilled academic experts, a private sector invested in increasing milk supply, and silage trials underway in different regions, Morocco is poised to carry a wave of innovation to the smallest producers in the dairy industry.

Farming with and without silage intervention: Annual profitability from milk per farm comparison

MILK SALES	Low Profitability	High Profitability	Silage Intervention
Average production per cow per year	3,000 liters	3,000 liters	3,600
Gross revenue			
<i>Total average milk revenue</i>	24,750	24,750	29,700
Cost of production & sales			
Self-produced feed (cost to produce)	6,300	6,300	9,000
Straw (purchase)	3,600	3,600	3,600
Concentrate feed (purchase)	19,800	11,100	10,000
<i>Total average cost of production & sales</i>	29,700	21,000	22,600
TOTAL PROFIT	-4,950	3,750	7,100
All monetary figures in Moroccan dirhams.			

Note: A typical farm generates an additional 5,800 Moroccan dirhams annually in profit from the sale of a calf

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FIELDWORK

Team members from MIT D-Lab spent almost two months in Morocco getting to know smallholder farmers in the Tifelt-region of Morocco. Building relationships and trust were key to understanding context and completing productive and informative interviews. Pictured at left, D-Lab's Gwyn Jones (third from right), with Tiflet farmers and the project translator Youssef Khalfaoui (third from left).

Next Steps

Moving forward, D-Lab's role could be centered on connecting and aligning the milk processing and microfinance industries to form effective partnerships.

D-Lab could also play a role in supporting the development of a participatory engagement process for small-scale farmers and in catalyzing technology innovation throughout the value chain. This can be done by engaging Moroccan academic institutions in the development of an innovation platform to engage local students in designing effective technological solutions for the betterment of the small-scale farmers' livelihoods.

Future Impact

Needs Assessment for Livelihood Improvement of Small Scale Cattle Farmers in Morocco is one of a series of studies to enable microfinance institutions to provide increased access to new technologies and practices that will improve the lives and livelihoods of people living in poverty in the Middle East and North Africa (MENA) region.

While the results from this study are specific to the context and market in Morocco, many of the findings and insights about the needs assessment process can be applied to future assessments in other geographic locations within the MENA region.

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Further information & full report

Kendra Leith, Evaluation Manager | kleith@mit.edu | 617-324-6008
D-Lab | Massachusetts Institute of Technology
77 Massachusetts Ave., Bldg N51-317, Cambridge, MA 02139 USA
d-lab.mit.edu/scale-ups/research-and-development

Launched in 2011 by D-Lab, the Scale-Ups program assists social entrepreneurs from MIT and the developing world, as well as NGOs and corporations, to bring poverty alleviating technologies to market at scale.

