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**Pakistan is a large and well-established economy, but it faces many challenges in stimulating inclusive rural economic growth.** Despite modest growth, poverty is prevalent in 45 per cent of the population, reaching up to 90 per cent in remote rural areas. MDF Pakistan found that large firms were well connected to innovation, investment and export markets, yet they rarely entered remote rural areas. Conversely, small and medium enterprises (SMEs) that serviced large swathes of the rural economy were significantly disconnected from innovation, technical expertise and investment.

**The rural dairy and meat sector presented a feasible opportunity for inclusive growth,** as Pakistan has the fifth-largest livestock population globally, with small farmers (landless and small landholders) owning 80 per cent of the country's animals. In addition, over six million households in Pakistan have some livelihood dependency on livestock for milk or meat.

**Numerous constraints inhibited livestock productivity.** Despite Pakistan's significant livestock population, its dairy and meat sector was not nearing its potential. Small livestock farmers lacked access to nutritious fodder, animal health and nutrition inputs, information about animal husbandry and finance. They were also disconnected from formal dairy and meat markets. MDF identified poor animal nutrition as a key constraint to livestock productivity. Its analysis showed that, regardless of improvements in other areas, farmers would see immediate improvements in animal yields if they used quality fodder. However, livestock needs for nutritious fodder outstripped supply by more than 70 per cent.

**Silage is a highly nutritious and cost-effective fermented fodder made from maize (corn) that can rapidly increase productivity.** It offers far superior nutrition compared to other types of fodder available in Pakistan, significantly enhancing livestock milk yields and improving overall animal health. Small and landless farmers had few options for fodder for their animals, but silage seemed to offer a solution.

**Despite numerous efforts over a decade, silage uptake remained limited.** Since 2006, the private sector, donor-funded programs and government departments have promoted the benefits of silage to commercial and small farmers. Although these efforts created some awareness among small farmers, they did not translate to a significant level of silage uptake. Silage was only available for purchase in large 300kg and 1,000kg bales that were cost-prohibitive for small farmers and difficult to transport. Furthermore, large bales were only available close to formal markets, mainly in South Punjab.

**There was an urgent need for an innovative silage business model.** MDF's analysis identified an innovative business model that could address many of the prevailing problems: a handful of medium-sized farmers had become silage entrepreneurs. They were producing and selling 60kg silage bales to neighbouring small farmers. For the first time, silage was available in the right size, at the right price and with a distribution model for small rural farmers, albeit only in small pockets of the country.

**MDF analysed why this solution had not been adopted more widely in the market**

and found that numerous supporting functions of the silage market were underperforming, preventing more mid-sized farmers from becoming silage entrepreneurs. For example, the machinery required to produce small-baled silage was difficult to procure and expensive. There were also no financial products to help farmers purchase the expensive machines. Additionally, most mid-sized farmers had never heard of the innovative business model and did not know how to produce quality silage. Therefore, demand for silage from small farmers was limited because not enough information was available to demonstrate its value.

**MDF developed a pilot initiative designed to target the market functions that had constrained progress to date.** A seed company—Corteva Agriscience (previously known as Pioneer Seeds)—had attempted a pilot of this innovation. However, it could not get many farmers to trial the model, as the small-bale equipment was prohibitively expensive and not readily available in Pakistan. In 2014, MDF partnered with Corteva Agriscience to pilot the model again. This time, MDF would support farmers to procure the machines, and Corteva Agriscience would identify mid-sized farmers who could become silage entrepreneurs and provide the necessary technical support.

**MDF and Corteva Agriscience began the pilot in South Punjab, which presented the least risk and the greatest opportunity for success.** This pilot would allow MDF and Corteva Agriscience to test the model and monitor how it adapted to market dynamics before rolling out the innovation to regions with more challenging conditions. The pilot was expected to benefit MDF's target group by making silage accessible and affordable, resulting in higher milk and beef (meat) yields and an increase in the incomes of small livestock farmers. Furthermore, MDF anticipated that the business model would improve the income of the households that produced and sold silage maize to the new silage entrepreneurs. It would also likely positively impact the incomes of the labourers hired by the silage entrepreneurs to produce the small-baled silage.

**The pilot was successful and led to sustained, small-scale, functional change.** The business model proved profitable, with the first silage entrepreneurs beginning to receive a return on their investment within the first year. Uptake by farmers was rapid, and demand quickly outstripped supply. Assessments showed that all farmers who started using silage saw increased milk yields: on average, using silage increased yields by about 1.5–4L per animal per day, equivalent to 20–55 per cent increases.<sup>1</sup> Some farmers also reported increased health and weight of meat animals. Each of the silage entrepreneurs employed four to five labourers, and many procured silage maize from other farmers.

**The business model evolved differently in different regions.** As the uptake of 60kg silage bales increased among small farmers, silage entrepreneurs began to adapt and improve the initial business model independently. After positive trials of the 60kg bale, some landless and smallholder farmers continued to purchase them. However, other

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<sup>1</sup> Milk yield varies by region and is affected by breed, climate and other factors in addition to how nutritious fodder is. On average, small farmers were getting 6–8.5L of milk per animal per day before using silage.

smallholder and mid-sized farmers stopped purchasing them and started making their own silage. This shift created a business opportunity for silage entrepreneurs to extend the business model to include machinery rental and contract farming. Adaptations varied by region because of different market conditions, but the core model was successful across the board.

**A sustainable and scalable solution to the lack of finance for machinery was needed for expanding the silage business innovation.** The farmers interested in becoming silage entrepreneurs needed to access affordable finance to buy equipment. They also needed access to the after-sales support for maintaining machinery on an ongoing basis. MDF partnered with Cattlekit, a Pakistan-based machinery company, and Bank Alfalah, one of Pakistan's leading private banks with a large agribusiness division, to introduce a loan product that mid-sized farmers could use to buy small-bale machinery at preferential interest rates. Cattlekit supported Bank Alfalah to offer preferential interest rates during the pilot, and Bank Alfalah strongly advocated a policy change with the State Bank of Pakistan (SBP).

The combined efforts of these two MDF partners resulted in SBP responding with a policy that enabled banks to extend loans for silage machinery at 50 per cent of the prevailing interest rates permanently. The uptake of the new loan product has been slow but is growing. MDF also supported Cattlekit in introducing a machinery rental offer to make equipment more accessible and affordable to a greater number of farmers while also encouraging trials for farmers with the potential to purchase their own equipment.

**MDF experimented with improving distribution to scale up access to the 60kg silage bales.** MDF piloted an intervention with a medium-sized firm that had a distribution network. The firm had the capacity to produce small silage bales on a large scale and distribute them to areas where the small bales were not available and silage maize could not be grown. MDF also monitored other developments among distributors, including small-scale distribution mechanisms that emerged among silage entrepreneurs. It concluded that selling small silage bales directly to small farmers through a decentralised model was the most cost-effective and inclusive solution.

**MDF recognised the need for greater awareness about the silage business model to increase uptake.** MDF supported Cattlekit in hosting awareness-raising events with panellists from Cattlekit, Corteva Agriscience and Bank Alfalah, as well as local government officials and successful silage entrepreneurs. The events connected mid-sized farmers who might become entrepreneurs with experts who could answer their questions and guide them through the process of becoming silage entrepreneurs. The events, called 'silage *baithaks*', reached 1,300 farmers by June 2020. The overwhelming feedback has been that firms and farmers value the sessions, as they allow for hands-on contact with the machinery, informative presentations from experts and practical discussions.

MDF also supported Cattlekit in running a media campaign promoting the small-baled silage business model. Infomercials, a documentary and print media material were developed and are estimated to have reached over 15,000 farmers with information about establishing a silage business.

## **The innovations have achieved significant systemic change.**

Since MDF rolled out its first innovation in the silage sector in 2015, the key changes that have contributed to system-wide change over 2016–2020 include:

- Milk yields have increased by 1.5–4L per animal per day, equivalent to 20–55 per cent increases in productivity.
- Meat farmers who use silage have reported increased health and weight of meat animals.
- 51,800 small farmers have increased their incomes from improved livestock productivity.
- An estimated 121 silage entrepreneurs are now producing small silage bales in six regions of Pakistan.
- Approximately 5.5 million 60kg silage bales have been sold to date.
- Silage entrepreneurs have created 526 full-time equivalent (FTE) jobs.
- Silage entrepreneurs buy over 94,000 tonnes of silage maize crop annually.<sup>2</sup>
- 2,550 households have increased their incomes through silage maize crop production.
- The number of silage machinery importers serving the small-bale market has increased from just one firm in 2014 to seven firms in 2020.
- There has been an increase in local industries—such as plastic film manufacturers and inoculant producers—that specifically target silage entrepreneurs.
- Interventions in the silage market for farmers, workers and silage entrepreneurs have generated PKR 3.5 billion in net income to date.

The MDF Pakistan program officially closed in June 2020, but some post-implementation work continues. The market functions that MDF targeted for change when it began work in silage (i.e. machinery, finance for machinery, information about producing quality silage, information about the benefits of silage and information about the innovative business model) have continued to perform without MDF support and show signs of adapting and evolving independently. Encouragingly, MDF has observed other independent changes that support the original silage innovations, such as changes in financial regulations and the availability of accessories for making silage. These spontaneous adaptations in different supporting functions suggest that the wider market system responds to and begins to support the innovations MDF introduced.

## **MDF has learned important lessons about what it takes to trigger lasting systemic change in a large economy.**

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<sup>2</sup> Based on assessments from 2019, the last year in which maize crop was assessed in all regions. Assessments from 2020 record notable growth in this number in the regions assessed.

- Lesson 1: Employ the full range of facilitation tactics to work with large firms.

Large economies offer the prospect of large-scale impact, but aid programs are only likely to achieve this if they form partnerships with the large national and multinational firms present in such economies. MDF identified players that were interested in pushing their commercial frontiers to capture 'bottom of the pyramid' markets, worked to understand what had prevented these players from introducing the innovation independently, developed an offer targeted to large firms' specific needs (which are rarely financial) and built credibility with potential partners by demonstrating a nuanced understanding of the market.

- Lesson 2: Do not underestimate the importance of small-scale and informal enterprises.

Programs that can connect large firms to SMEs to leverage their complementary strengths and incentives have the best chance of achieving sustainable, scaled change in a large, diverse economy. Large multinational and national firms rarely have an incentive to provide goods and services directly to customers that can only purchase in very small quantities and are widely dispersed across large areas. However, local SMEs do have an incentive for this market and have developed business models that enable them to serve it profitably. By building business relationships between these different segments of the private sector, SMEs can access technical expertise and innovation and pass it on to small farmers and other rural customers. They can also aggregate orders and manage logistics to make the rural market attractive to larger firms.

- Lesson 3: In a large economy with significant internal diversity, use a phased approach to introduce innovation and be prepared to adapt the model to serve different regions with different market dynamics.

MDF's experience shows that starting in an area where a pilot is most likely to succeed and taking a phased approach to adding locations can maximise learning and success. A phased approach helps develop a proof of concept to stimulate the interest of more cautious players in more conservative regions.

Additionally, such an approach gives the program and its partners time to monitor adaptations to the model and adjust the innovation to suit different markets.