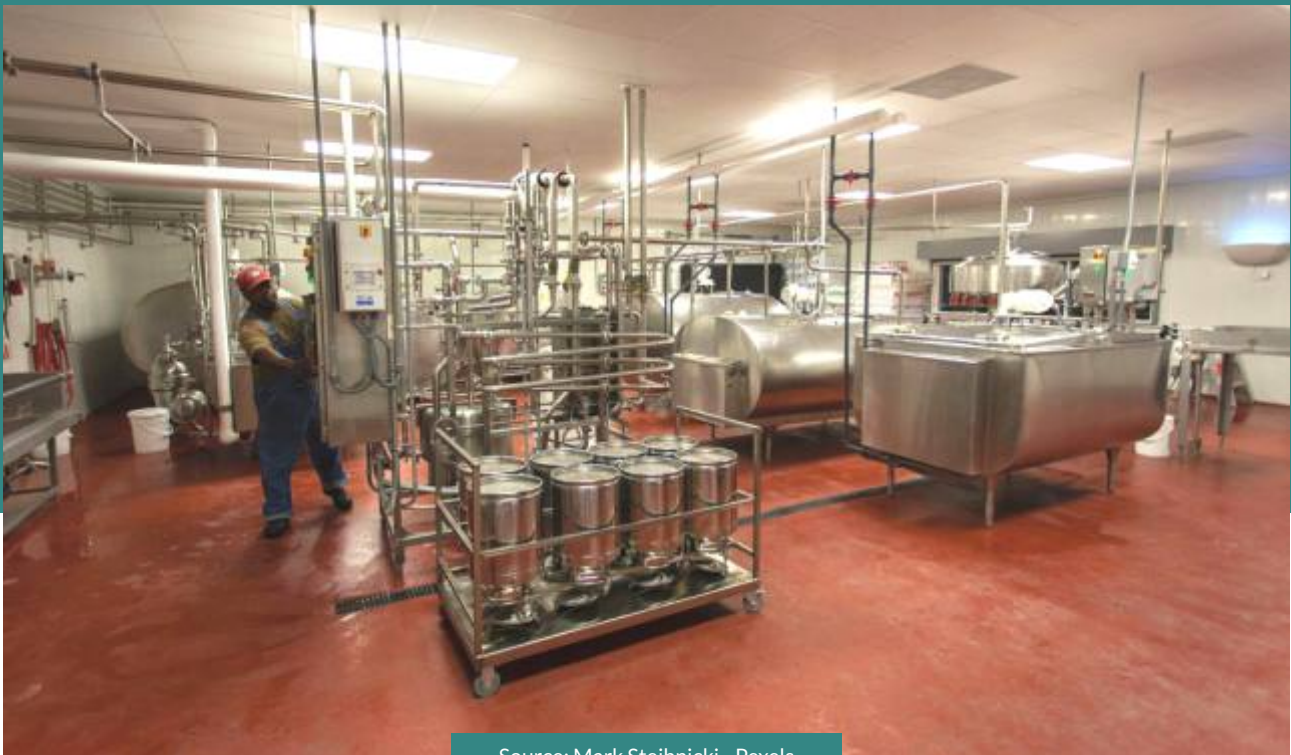


A multi-stakeholder recipe to reduce food loss and waste



Collaborative Models for Affordable Nutrition with Whey

The GAIN Access to Better Dairy (GA2BD) project in Pakistan, turning food waste to nutrition



Source: Mark Steibnicki - Pexels

In 2022, the Global Alliance for Improved Nutrition (GAIN) along with ARLA Food Ingredients and the SUN Business Network in Pakistan rolled-out the GAIN Access to Better (A2B) Dairy Project, of a market-based approach to repurpose a near-waste of a milk by-product, 'Whey' into a nutritious and affordable drink.

Key messages

- Pakistan's dairy industry accounts for 12% of its agricultural GDP, yet the agrifood system suffers from food loss and waste with 40% food wasted each year.
- Innovative 'waste-to-food' interventions devised as public-private sector collaborative initiatives, are stemming and reversing food loss and waste in Pakistan.
- A whey-based, protein-rich and affordable drink, a great source of nutrition was developed as a palatable product, adding to the socio-economic-environmental win-win. As per GAIN's draft report "Whey water and its impact on environment" information generated through interviews and literature available, cheese manufacturing industry in

Pakistan is wasting nearly 43.7 million liters whey, disposed of in sewerage water every year. The financial analysis as per proposed recipe formulation indicates that repurposing this near-waste whey into a nutritious product could yield 437 million servings of 200 ml each. This initiative is financially viable, leading to profitability for benefits for dairy business partners and the broader dairy value chain.

- The Supply Chain Analysis for Nutrition (SCAN) tool developed by the GAIN was used for analysing specific supply chain weaknesses or bottlenecks and suggesting potential mechanisms to improve nutrition along the supply chain.
- The GAIN Access to Better Dairy – Greening and Scaling partnership, brought together private companies, government agencies, civil society organizations, and academia to co-create solutions to fulfill multiple objectives of: affordable, good taste, high nutritional value, food safety, environmental protection, and business sustainability.
- The 'SHARP approach' (Sustainable (S), Healthy (H), Affordable (A), Reliable (R), Preferable (P)) was used to find the “sweet spot” for optimizing competencies of multi-sectoral partners to find a good food solution, with the whey-based drink.

In 2022, two sets of sustainability conundrums plagued Pakistan. While severe floods wreaked havoc on the country's food basket and economy, pushing 14 million into seeking emergency food assistance, its large dairy industry however continued to generate massive amounts of whey, a milky-white liquid, rich in protein, left after the production of cheese, which was being discarded as waste water. Whey – a rich source of proteins, vitamins, and minerals for the human body – when disposed of as waste water, was disrupting local ecosystems. At that point, a product that repurposed the whey – from waste product to nutrient-rich food – seemed like it stood to solve multiple problems of generating yet another source of income, providing a nutrient-rich drink and being conducive to environmental effects.

Partners in the private and public sector are increasingly interested in collaborating for improved health and nutrition goals and reaching a more effective Food Systems Transformation. But while momentum for public-private engagement is building, there is less clarity on how to go about it effectively. This case study draws focus on four key factors needed for enterprises with a better health focus, to reach scale: An enabling policy environment, adequate funding, business and technical skills support, and market linkages.

Pakistan reports over 40% of its food is wasted each year.¹ This includes food loss during the supply chain (production, post-harvest handling, agro-processing, distribution and consumption) that occurs every year. Achieving food security and nutrition is a high priority for Pakistan.

A number of important policy initiatives in fact have been taken in this direction, including the concept development of the National Zero Hunger Program, the food security assessment survey, commitment of the Government for Sustainable Development Goals particularly SDG 1 and 2 for Poverty and Zero Hunger Challenges, and devising future strategies through a National Food Security Policy.

¹ Report by the Ministry of National Food Security & Research

Overcoming the better food and nutrition challenges of Pakistan

Pakistan has a population of 240 million², with nearly 22%³ living below the national poverty line and 43% of its population⁴ being food insecure. While conflict and insecurity, economic and climatic shocks have had a role in deepening the crisis, a contributing factor has been the postharvest food losses that Pakistan faces, of up to 40-50% due to supply chain and other technical issues related to storage and transportation of food. Perishables (fruits, vegetables and dairy), one of the most nutritious of foods, suffer the most. Around 15 percent of total milk produced in Pakistan (Estimated at PKR 1 trillion gets wasted due to improper storage and handling) whereas in a country like Holland, only one percent of milk produced is wasted.⁵

High quality proteins are critical during growth, health recovery and maintenance throughout life. Whey, a milk byproduct is in fact proven to cause reduction of diarrhea in infants and could combat moderate acute malnutrition in children. Pakistan is the fourth-largest dairy producer in the world, producing nearly 62 billion litres a year.

Pakistan's dairy industry is a vital component of its agriculture sector, accounting for over 12% of the country's agricultural GDP.⁶ It contributes significantly to the economy and provides livelihoods for millions while being a key source of income, especially for small-scale farmers and rural communities. Yet, most of Pakistan's poor struggle to afford milk and milk products – an important source of nutrition – despite the country being the fourth-largest dairy producer in the world, with an annual milk production of 62 million litres.⁷ While protein also happens to be the primary macronutrient causing malnutrition among children and women, Whey, a rich source of protein, remains underexplored in Pakistan. High quality proteins are critical during growth, health recovery and maintenance throughout life. Whey, a milk byproduct is in fact proven to cause reduction of diarrhea in infants and could in fact combat moderate acute malnutrition in children.

For every 1 kilogram of cheese the dairy industry produces, it generates 9 liters of Whey. The high levels of organic matter in Whey make it an environmental hazard for ecosystems, requiring complex and expensive sewage treatments.

A similar set of problems had been addressed in Ethiopia, in 2017, under the GAIN Access to Better Dairy Project, as a market-based approach to convert near waste of Whey water into a nutritious and affordable, whey-based drink. The four-year project funded by Danida Market Development Partnerships (DMDP), Ministry of Foreign Affairs of Denmark extended for two more years in Ethiopia now, was also extended to Tanzania and Pakistan.

Public-Private solution for stemming food loss & waste in the dairy sector

Its 2021 iteration in Pakistan – a collaboration between local dairy processors in Pakistan, Arla Foods Ingredients (AFI, Denmark), Global Alliance for Improved Nutrition (GAIN, Switzerland), and the SUN Business Network in Pakistan – has been aimed at showcasing an innovative business model with emphasis on circular economy principles. The whey-based drink being produced as a part of the pilot project in Pakistan, enables the low income population to consume a dairy byproduct-drink enriched with protein, vitamins, minerals, contributing to fighting malnutrition.

² UNFPA World Population Dashboard - Pakistan

³ ADB Poverty Data - Pakistan (2018)

⁴ ISSI Acute Food Insecurity Brief 2022- Pakistan

⁵ The Pakistan Business Council - Modernising the Dairy Sector March 2022

⁶ PCFWC, 'Institutionalizing a Waste Reduction Culture in Food Manufacturing,' *Pacific Coast Food Waste Commitment*, Fall 2022, pp. 1-16.

⁷ Government of Pakistan Statistics 2021

The “Waste to Value” approach adopted by the GAIN-SBN-ARLA partnership model used a three-pronged approach to demonstrate benefits of post-harvest loss reduction. The two key objectives of the project were to increase acceptability and availability of an affordable, safe and nutritious milk-based products for children and women to improve nutrition status; and to catalyze market development of the dairy value chain, to increase profitability for small holder farmers, local processors and other value chain actors creating more regular supply of milk for low-income consumers. The SHARP model was aptly able to capture the 'sweetspot' of this unique partnership.

The “Waste to Value” approach has a three-pronged approach in which it demonstrates the benefits of post-harvest loss reduction through: i) increased focus on hygiene practices for milk-handling to reduce spoilage ii) extending shelf-life and value addition by fermentation using best-in-class cultures to product byproducts, and iii) using by-products from cheese production, which often are wasted, by turning it into a healthy dairy-based drink.

Charlotte Sørensen outlines the benefits of partnership for better nutrition in dairy in a most inspiring way, saying “The DNA of Arla Food Ingredients is all about sharing knowledge to become better together. We have been working on collaborative projects to bring technology into optimizing food and nutrition. The GAIN-Nordic partnership stands to benefit the dairy industry, with partnership projects moving from Ethiopia through Zambia and now in Pakistan and Tanzania. Working with varied partners has brought forth a multitude of best experiences and resources, ensuring that one plus one equals three!”

By using several tonnes of otherwise waste Whey, which also has a longer 3-month shelf life, it will also address the environmental impact of the dairy industry. Lastly, by re-channeling dairies into producing another by-product, using existing infrastructure, it also will work towards boosting economic growth, and promoting livelihoods and job opportunities of the local dairies.



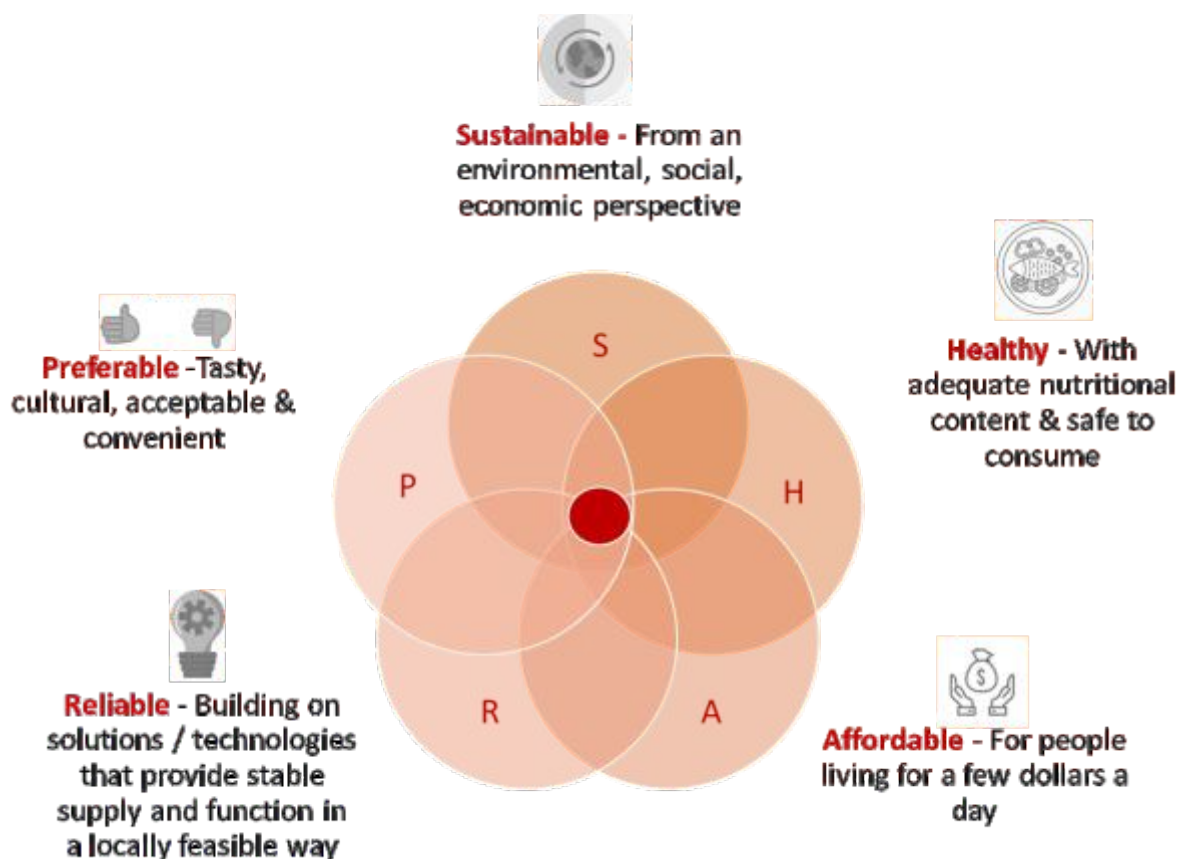
The cheese extraction process from milk underway at a local dairy

Initiated by GAIN, the project is facilitated through the SUN Business Network, in consultation with the SUN Secretariat in Pakistan and the Ministry of Planning, Development and Special Initiatives (Government of Pakistan) under the overall stewardship of SUN focal point. This format of Public Private Engagement (PPE) for better nutrition, has AFI providing technical expertise for recipe development, product design and development of key ingredients (dairy for the initial pilot phase). The project value chain also involves various dairy processors like Fauji Foods Limited and Ajmair Food Pvt Ltd/ Cakes and Bakes, who make cheese, pre-mix suppliers, ingredient suppliers, different marketing and distribution channels, all of whom collaborate through the SBN coordination platform.

The Waste-to-Value approach of the GAIN Access to Better Dairy (GA2BD) model : Demonstrates post-harvest loss reduction through increased focus on hygiene practices for safe milk handling and extending shelf life and value addition by fermentation using best-in-class cultures to produce yoghurt, as well as re-purpose by-products (Whey) from cheese production

The consortium of partners has been selected using the unique SHARP Approach,⁸ specifically developed for ensuring the success of this public private engagement model for countering food loss and waste. The SHARP approach aims to find the “sweetspot” for nutritious products serving as the foundation for scale up. This uses the convergence point of all competencies of diverse partners that is essential to find solutions to honor constraints for scaling up. The GAIN Nordic partnership model is a case in point as illustrated in the next page:

⁸ Interview of Charlotte Pedersen, GAIN at Nutrition Connect (Food Loss and Waste Series 2022)



The SHARP Model devised from the GAIN-Nordic-country partnerships, forming the basis for public private sector engagements and scale-up for preventing food loss and waste

The initial phase of the project in Pakistan thus involved a mapping of industries and assessment of their capacities, discussions around recipe formulation, composition and production of Whey and cost estimation for the final product of the whey-based drink to determine profit margins that would be agreeable to businesses, affordable for consumers and yet conducive to scaling-up.

A triple win for People, Planet, Prosperity - The challenges, lessons & successes

When it was initially started, the idea of a whey-based nutritious drink was completely new in Pakistan. Positioning the unique concept, then mobilizing and convincing the dairy industry has been challenging for various reasons. Firstly, the dairies were less confident of the profit potential of such a product. This was more complicated, given the context of a series of economic recession and natural disasters occurring in Pakistan, because of which all dairies diverted their research and development (R&D) investment funds towards other more proven products emanating from the use of milk, and were initially reluctant to focus on a new product development. The second issue has been Customs clearance and trade barriers (for importing some of the secondary ingredients required for whey-based drink production) causing certain delays and bottlenecks in ensuring a smooth supply chain.

At each step of the way, convincing and building trust within a multitude of partners, be it the private sector, public sector, development sector partners or even local business community, has been the most rewarding aspect of this partnership model for stemming post-harvest losses and ensuring smooth supply chains.



SBN Pakistan team at the launch of the Access To Better Dairy Project in 2022

There have been factors that have worked in favor of the initiative and helped to smooth out these issues. Paramount, has been growing government interest in the project, aligning as it has, with the objectives of the Ministry of Planning, whose goal is scaling up multi-sectoral nutrition. “It is our Ministry’s job to facilitate and encourage businesses and initiatives that want to work on tackling issues like malnutrition, childhood stunting, and micronutrient deficiencies,” says Badar Uzman, Program Policy Officer, National SUN Secretariat, Ministry of Planning. “The government decided to support this initiative since we believe it is a cost-effective intervention that can help in scaling up nutrition,” he adds. The ministry has played a role for facilitation by connecting the project with other key stakeholders within the food industry, and other regulatory agencies within government. “When governments lead initiatives like this, it is always encouraging for businesses, due to the long list of bottlenecks that they otherwise may have to face,” he says.

In addition to this, the response of the private sector to the initiative has also been encouraging, especially after they have been made aware of its profit potential and more importantly, for the environment. “Most dairies in Pakistan are aware of the environmental impact of dairy waste and emissions in general. Most dairies are also helpful and vigilant for addressing malnutrition so they are willing to take steps to address these issues,” says Tanazza Sadaf, Portfolio Lead – GAIN Pakistan.

The product is currently in the final stages of development. The pilot phase has seen the dairy company distributing samples of the Whey-based drink among 300 school students in Pakistan, all of whom have responded favorably for the taste and acceptability of the drink.

The initiative marks a key success in PPEs for eliminating food loss and waste emanating from the synergistic planning, development and roll-out of this intervention, between industry, business and the public sector. Whilst aligning with Pakistan’s national developmental objectives such as the Pakistan Vision 2025⁹ and Pakistan Multi-sectoral National Nutritional Strategy,¹⁰ Pakistan National Climate Change Policy¹¹ and Pakistan Dairy Development Plan¹² — this initiative also allows businesses to generate revenue,

⁹ UNFPA World Population Dashboard - Pakistan

¹⁰ ADB Poverty Data - Pakistan (2018)

¹¹ ISSI Acute Food Insecurity Brief 2022- Pakistan

¹² The Pakistan Business Council - Modernising the Dairy Sector

spelling a win-win for People, Planet and Prosperity. “The product is testament to the high potential of collaborative efforts succeeding in fighting multiple challenges,” adds Ms. Sadaf.

The driving idea behind the project is in thinking 'circular' and trying to optimize the value of anything perceived as food waste, and finding ways of repurposing it back to the food value chain. The first step is to see if it can be used as fertilizer or bio-gas for fields, the next step is to see if it can be used as animal feed. The last step is to see if it can be made fit for human consumption. This also involves behavior change, and a change in thinking patterns.

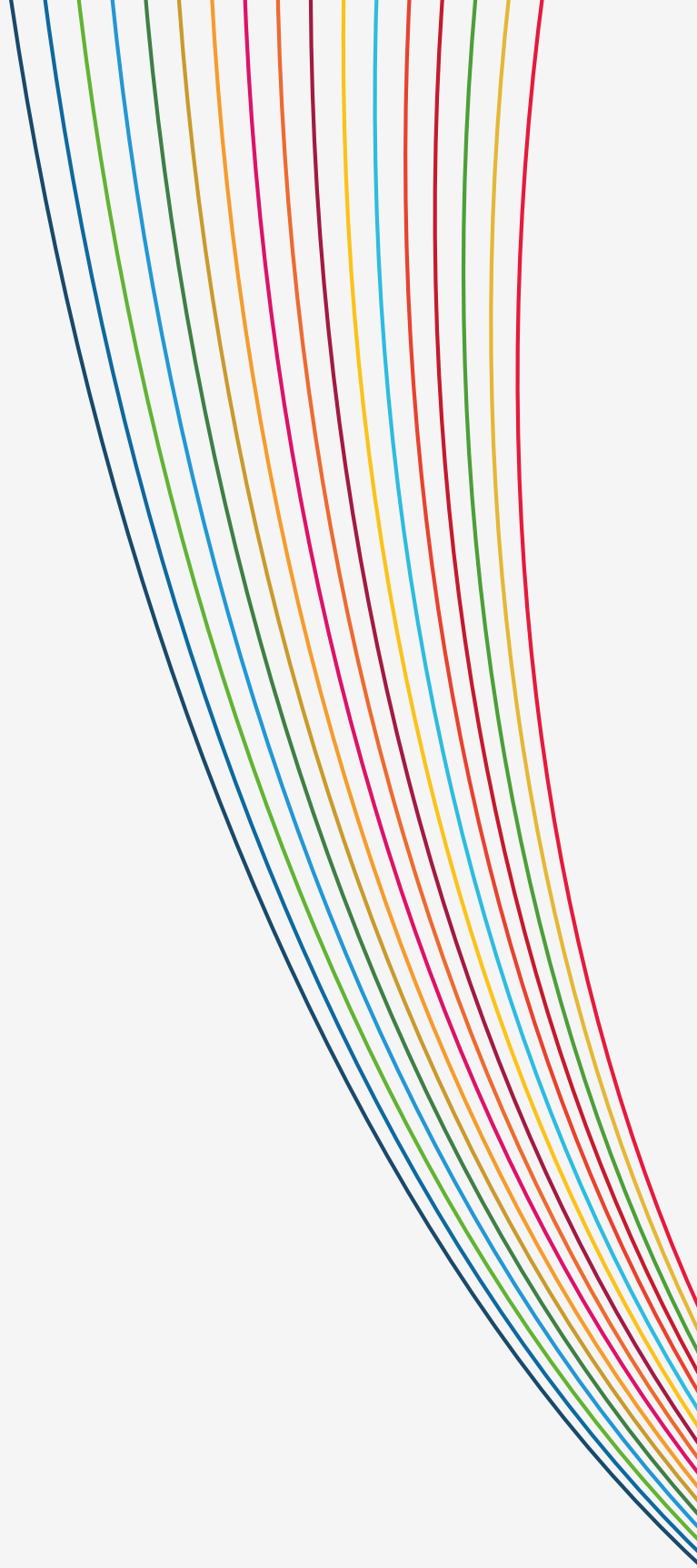
“Thinking how precious something is a key part of making this possible,” said Charlotte Pedersen, GAIN.

The way forward: Collaborating for a food systems change with 'No Food Loss and Waste'

To fight the challenge of food loss and waste in Pakistan, a set of challenges specific to this project, and the solutions-context surrounding it, needs to usher change. The post-harvest food loss especially of perishables need to be minimized. At a policy level, there is a need to engage provincial governments towards making new policies and regulatory framework to tackle food loss and waste across the food value chain. Alongside, behavior change campaigns targeted at both consumer and industry, are needed.

Already having worked in Pakistan and in a previous intervention in Ethiopia and Tanzania, the project is a promising model for scaling-up in many other countries and provincial contexts. The partners including GAIN, SBN and ARLA Food Ingredients are now also starting to explore Latin America as a next possible area of intervention to step-up focus on tackling food loss and waste with this special whey-based drink. Given its high-volume of cheese production and burgeoning challenges for malnutrition, this could augur well for the Latin American continent.

Set to have a food systems transformative change, at the level of environment, nutrition, business and livelihoods, the project is a promising triple-win in the PPE space.



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