



NESTLÉ DAIRY FACTORIES IN PAKISTAN: LOSSES ACROSS THE VALUE CHAIN

A Case Study

ABOUT NESTLÉ

Nestlé—a major nutrition, health and wellness company—seeks to enhance the quality of life and contribute to a healthier future. Our ambition for the planet is to steward resources for future generations, which guides our work toward achieving our 2020 commitments and supporting the United Nations Sustainable Development Goals.

WHY IS NESTLÉ MEASURING FOOD LOSS AND WASTE?

Nestlé is committed to further playing its part in helping to reduce food loss and waste. This helps the company secure supplies of agricultural raw materials it requires, as well as having a positive impact on society by supporting rural development, water conservation, and food security. This is in line with Nestlé’s “Creating Shared Value” approach to doing business.

We are continuously making efforts to improve the environmental performance of our operations in order to preserve natural resources and to be successful in the long term. Since 2006, Nestlé has reduced total waste for disposal* from its factories by 77 percent. With 182 Nestlé factories achieving zero waste for disposal at the end of 2016, we are now working toward zero waste for disposal in our sites by 2020. We measure food loss and waste to track progress against our targets.

* Waste for disposal: Any material that leaves a site and is destined for final disposal with no economic or ecological value. It includes landfilling and incineration without energy recovery.

About This Case Study

This case study is part of a series that shows how companies and others are using the *FLW Standard* to measure and reduce food loss and waste. Find more case studies online at www.FLWProtocol.org.

About the FLW Standard

The *Food Loss and Waste Accounting and Reporting Standard* (or *FLW Standard*) helps companies, countries, cities and others quantify “food loss and waste”—what to measure and how to measure it—and encourages consistency and transparency in the reported data.

A summary of definitions and requirements of the *FLW Standard* can be found online along with related tools to help users report the scope of their inventory and select a method for quantification.

WHAT HAS BEEN YOUR EXPERIENCE WITH USING THE *FLW STANDARD*?

In 2014, to further understand and reduce the waste occurring in our value chain, we initiated a milk loss and waste mapping exercise in Pakistan, applying the draft *Food Loss and Waste Accounting and Reporting Standard*. Reporting our data in conformance with the *FLW Standard* has been a valuable process that allowed us to identify quantities and destinations for each type of milk loss and waste along the value chain.

The Pakistani dairy sector was chosen because of its complexity, the high volumes involved, and because it provided an opportunity to test the efficiency of our dairy hub model. Working with external consultants, we mapped the value chain from farms to consumers. In total, Nestlé processes 480 kilotonnes of milk a year, sourced mainly from traditional small farms but also some larger operations. Before reaching our factories, the milk transits through village milk collection and chilling centers. After processing, 90 percent of it is sold through traditional trade channels to consumers.

For each stage of the value chain, we analyzed all potential causes of loss and waste. Losses and waste were quantified (either through direct observation or interviews with farmers, retailers, consumers, and others) and extrapolated across the value chain.

WHAT CHALLENGES IN MEASURING FOOD LOSS AND WASTE HAVE YOU ENCOUNTERED AND HOW DID YOU OVERCOME THEM?

To overcome the challenge of measuring food loss and waste in a complex value chain in Pakistan, we conducted a detailed mapping across the entire value chain (from farms to consumers). This allowed us to define more precisely the scope and to identify the main food loss and waste sources and destinations.

To overcome the challenge of measuring milk loss and waste in the farming stage, we conducted a sampling exercise during field visits and linked the observations with the interviews of people working in the field, professionals (vets), and dairy experts. The estimates were then extrapolated to a larger sample (of same farm size and practices) and then to the whole country.

WHAT ACTION HAS NESTLÉ TAKEN AS A RESULT OF MEASURING ITS FOOD LOSS AND WASTE?

The total milk loss and waste across all stages of the value chain was estimated to be only 1.4 percent of milk produced. About 40 percent of the losses and waste were generated at the farm level stage. This is significantly lower than an estimate reported in an Asian Development Bank study in 2004. That study found that approximately 15 to 19 percent of milk sold by Pakistani farmers was lost or wasted en route to market.

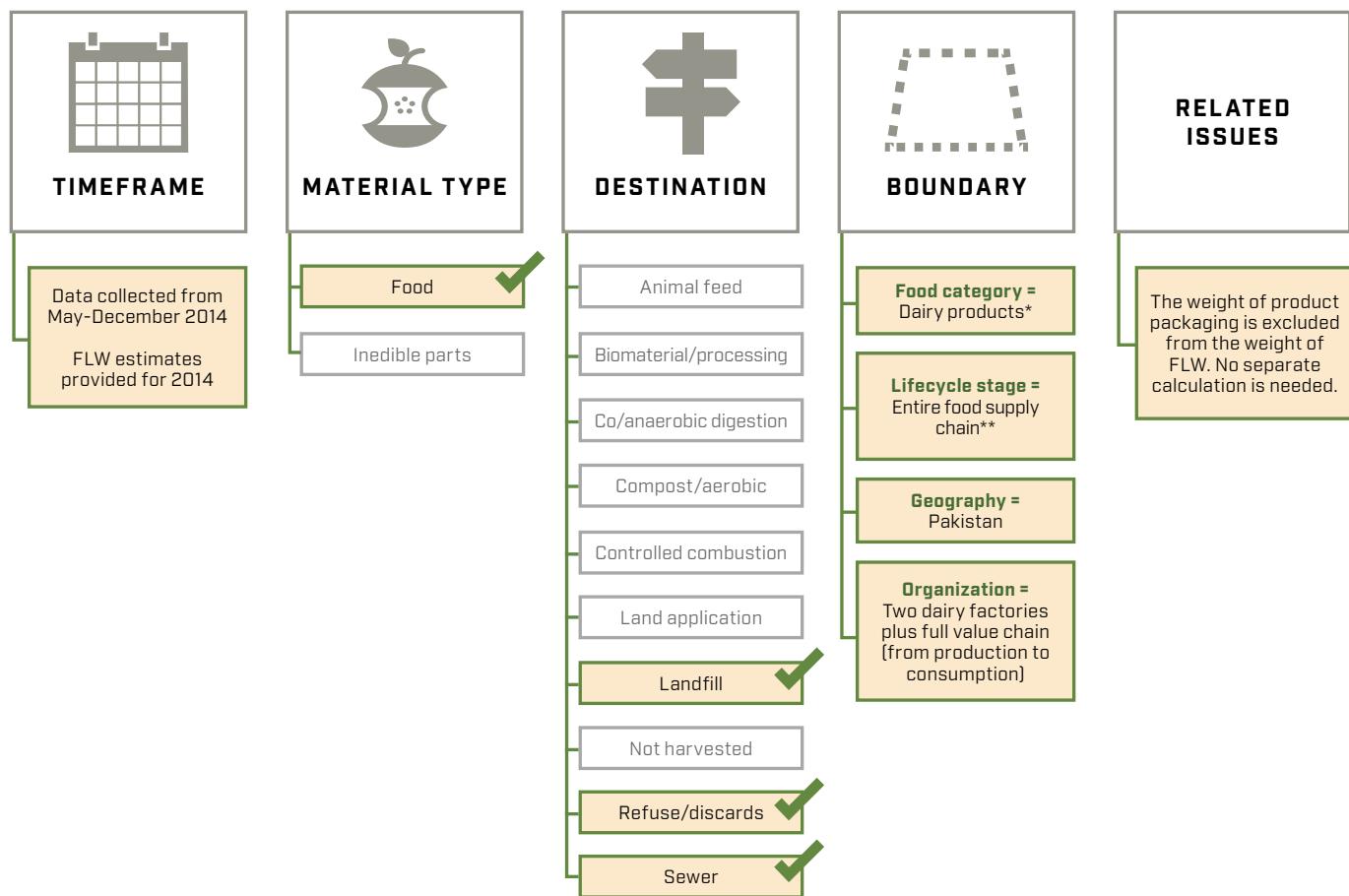
This low level of loss and waste confirmed for us that the steps we have been taking over many years to reduce loss and waste are working. Actions we have taken include:

- ▶ Providing adequate cooling, storage, and transportation systems that are used by farmers
- ▶ Training farmers and sharing best practices among them on approaches that not only help increase milk production, but also reduce post-harvest losses (e.g., rejection by chilling centers)
- ▶ Implementing lean management and problem solving methodologies to identify, reduce, and report losses and waste from farm to factory.

Losses could be reduced even further through improved management of products at the retail stage. For more information on our actions related to food loss and waste, please see our “Nestlé in Society” report at www.nestle.com.

WHAT IS INCLUDED IN THE SCOPE OF THIS FLW INVENTORY?

The following figure visually represents the scope of Nestlé Pakistan's milk loss and waste inventory using the *FLW Standard*. While all possible types of destinations were assessed in the inventory, only landfill, refuse/discards/litter, and sewer/waste-water treatment were considered as milk loss and waste.



*Dairy products (GSFA 1.1.1.) or (CPC2.1 Group 22110)

**Five stages (ISIC codes): 0141 – Raising of cattle and buffaloes; 1050 – Manufacture of dairy products; 4912 – Freight rail transport; 4721 – Retail sale of food in specialized stores, and 9820 – Undifferentiated service-producing activities of private households for own use.

HOW DOES THIS INVENTORY MEET THE FLW STANDARD'S REQUIREMENTS?

The table below provides a summary of how this FLW inventory meets the eight reporting and accounting requirements contained in the *FLW Standard*.

FLW STANDARD REQUIREMENTS & DESCRIPTION OF NESTLÉ'S FLW INVENTORY

(see www.FLWProtocol.org for details and guidance)

1. Base FLW accounting and reporting on the principles of relevance, completeness, consistency, transparency, and accuracy

- **Relevance:** The entire value chain was evaluated in order to identify relevant hotspots, where milk and dairy products losses and waste were higher than expected and therefore could be reduced.
- **Completeness:** The entire value chain was evaluated.
- **Consistency:** For each part of the value chain, interviews were conducted and answers compared with data log books. Estimates were based on the extrapolation of data done in a region to the whole Pakistan market.
- **Transparency:** Destinations of losses and waste were clearly stated except in the cases where there was no split reported between product wasted and product sent to animal feed (seen as a valorization option). Those cases were accounted for separately.
- **Accuracy:** Varies largely depending on part of the value chain studied and if the data reporting was based on a one-time observation linked to interviews (on farms) or on actual datalog books.

2. Account for and report the physical amount of FLW expressed as weight

Reported as tonnes

3. Define and report on the scope of the FLW inventory [see *FLW Standard* for additional details]

Timeframe: Data reported for January 1–December 31, 2014 (data collected from May–Dec 2014).

Material type: Food. (No inedible parts were included because this study focused on dairy products that do not have inedible parts, e.g., liquid milk, powder milk, yogurt.)

Destinations: All possible types of destinations were assessed in the inventory. However, only landfill, refuse/discards/litter, and sewer/wastewater treatment were considered as milk loss and waste.

Note: Due to a lack of specific data, it was not possible to estimate the amount of losses/waste by all the final destinations (e.g., to clarify the share of discarded milk eventually valorized into animal feed).

Boundary:

- **Food category:** Dairy products
 - Upstream: raw milk [CPC2.1 Group 22110, processed liquid milk]
 - Downstream: U.H.T. milk, powder milk, and yogurt [GPC Code Brick: 10000026—milk/milk substitutes (shelf stable)]
- **Lifecycle stage:** Entire food supply chain (five stages)
 1. ISIC code: 0141—raising of cattle and buffaloes
 2. ISIC code: 1050—manufacture of dairy products
 3. ISIC code: 4912—freight rail transport
 4. ISIC code: 4721—retail sale of food in specialized stores
 5. ISIC code: 9820—undifferentiated service-producing activities of private households for own use
- **Geography:** Pakistan, UN country code 586
- **Organization:** Two dairy factories for Nestlé Pakistan Ltd and the entire value chain of Nestlé Pakistan, including milk production on farms (which are outside of Nestlé's operations) all the way to the point of consumption.

Related issues: Weight of packaging is excluded. No calculation was needed to separate packaging weight from food loss and waste.

In the factories, residual FLW is flushed through pipes during the cleaning process. The effluent is sent through an on-site wastewater treatment process. The weight of the remaining sludge is included in this inventory.

4. Describe the quantification method(s) used. If existing studies or data are used, identify the source and scope

Direct weighing and surveys (interviews and visits); additional details are provided below under "About the methodology."

5. If sampling and scaling of data are undertaken, describe the approach and calculation used, as well as the period of time over which sample data are collected (including starting and ending dates)

See details below under "About the methodology."

6. Provide a qualitative description and/or quantitative assessment of the uncertainty around FLW inventory results

The degree of uncertainty varies depending on the source of the information and on the stages in the chain. A qualitative estimate is provided for each stage based on a general scale of 1–10 (with 10 signifying very accurate data). Specific qualitative scores for each stage were used to calculate a weighted uncertainty of "8." See additional details under "About the methodology."

7. If assurance of the FLW inventory is undertaken (which may include peer review, verification, validation, quality assurance, quality control, and audit), create an assurance statement

Not applicable

8. If tracking the amount of FLW and/or setting an FLW reduction target, select a base year, identify the scope of the target, and recalculate the base year FLW inventory when necessary

Not applicable

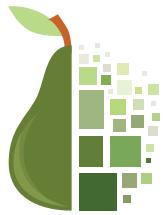
ABOUT THE METHODOLOGY

The following table provides additional detail on the quantification methods used to gather data at different stages as well as the estimated uncertainty.^a

STAGE	QUANTIFICATION METHODS USED	UNCERTAINTY <i>Qualitative estimate based on a scale of 1–10, with 10 signifying very accurate data</i>
Farms	<p>Type of data: Milk production lost or wasted in incidents on farm [e.g., spillage]</p> <p>Quantification method: Interviews/visits conducted in several types of farms:</p> <ul style="list-style-type: none"> ▶ 7 traditional and small farms ▶ 5 commercial dairy farms ▶ 4 medium farms ▶ 1 mega farm (Umer farm) ▶ Sarsabz farm (Nestlé training farm) <p>Extrapolation (scaling up of data) made based on the total number of farms of each categories from which Nestlé collects milk.</p>	Uncertainty: 3 (small sample size)
Milk handling: village milk centers (VMCs) and chilling centers (CCs)	<p>Type of data: Milk lost or wasted in VMCs and CCs because of handling</p> <p>Quantification method: Interviews/visits conducted in:</p> <ul style="list-style-type: none"> ▶ 4 village milk centers ▶ 6 chilling centers <p>Extrapolation made based on the total number of VMCs /CCs from which Nestlé collects milk.</p>	Uncertainty: 5 (small sample size but direct observations made)
Regional center	<p>Type of data: Milk rejected by Regional Center laboratory</p> <p>Quantification method: Data provided on volumes rejected in Renala district were compared to the amount collected in the district in order to derive a percentage. This percentage was then applied to the total amount of milk collected by Nestlé in Pakistan.</p>	Uncertainty: 7 (data provided by Nestlé is accurate but had to be extrapolated from one district to the entire country)
Upstream transit	<p>Type of data: Milk lost or wasted in transport between CC and factory</p> <p>Data provided by: Milk Collection & Dairy Development—Nestlé Pakistan</p> <p>Quantification method: Difference between milk received in factory and total milk loaded in CC</p>	Uncertainty: 10 (accurate data provided by Nestlé)
Factory	<p>Type of data: Losses and waste during processing in the factory</p> <p>Data provided by: Nestlé Pakistan—two factories</p> <p>Quantification method: Losses and waste are monitored closely, by weighing, measuring content, and comparing inputs (milk) and outputs (UHT milk, powder milk and yogurt).</p>	Uncertainty: 10 (accurate data provided by Nestlé)
Downstream transit	<p>Type of data: Milk lost or wasted in transport between factory and direct/handling distributors and International Key Accounts</p> <p>Data provided by: National Sales team of Nestlé Pakistan</p> <p>Quantification method: Measurement of the weight of the lorries in the factory. Data recorded in Nestlé internal software.</p>	Uncertainty: 8 (data provided by Nestlé, additional data treatment required to translate data into tonnes) ^a
Market returns	<p>Type of data: Actual market returns. This consists of product collected from the retailers by the distributors.</p> <p>Data provided by: National Sales team of Nestlé Pakistan</p> <p>Quantification method: Data reported at Nestlé as “Bad goods”</p>	Uncertainty: 9 (data provided by Nestlé) ^b
Consumer	<p>Type of data: Consumption habits in Pakistan</p> <p>Quantification method: Focus group discussions with dairy products consumers and interviews with experts (persons interviewed) on consumption habits in Pakistan.</p>	Uncertainty: 5 (qualitative consumer study results backed up by interviews)

^a Additional details have been published in the *Journal of Cleaner Production*. The case study is titled “Measuring food waste in a dairy supply chain in Pakistan.” It is available at: <<http://www.sciencedirect.com/science/article/pii/S0959652616321473>>.

^b For losses and waste of powder milk in downstream transit losses and market returns, the estimated volumes were expressed in fresh milk equivalent. This means that a conversion factor of 7.7 was applied to the weight of powder milk.



Food Loss + Waste

PROTOCOL

ABOUT THE AUTHORS

This case study was submitted by Javiera Charad (Nestlé) and Hélène Lanctuit (Nestlé) with input and review by Liz Goodwin, Craig Hanson, JP Leous, and Kai Robertson (representatives of WRI), as well as FLW Protocol Steering Committee representative Scyllia Ahlouwa (The Consumer Goods Forum).

ABOUT THE FOOD LOSS AND WASTE PROTOCOL

The Food Loss & Waste Protocol (FLW Protocol)—a multistakeholder partnership—has developed the global *Food Loss and Waste Accounting and Reporting Standard* for quantifying food and/or associated inedible parts removed from the food supply chain—commonly referred to as “food loss and waste” (FLW). World Resources Institute (WRI) serves as the FLW Protocol’s secretariat.

For questions, please contact flwprotocol@wri.org.

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