APRIL 2019

BARILLA FOOD LOSS AND WASTE REPORT

BARILLA BASILICO SAUCE 400g

STANDARD USED

Food Loss + Waste PROTOCOL

REPORT BY

last minute market

Barilla
The Italian Food Company. Since 1877.

INDEX

INTRODUCTION

www.gruppobarilla.it/bg.com

www.barillacfn.com

www.lastminutemarket.it

www.flwprotocol.org

Aware of the urgency emerging from the BCFN Foundation studies and in line with its purpose "**Good for You, Good for the Planet**" (www.barillagroup.com/en/our-responsibility), Barilla, as food company, has started to analyse three of its supply chains (pasta, tomato sauce and bread) in collaboration with **Last Minute Market (LMM)**, a spin-off from the University of Bologna.

Their goal was monitoring the food losses and wastage all along the value chains, identifying the causes and the measures to reduce them.

The reference standard used for this analysis was the global **Food Loss and Waste Accounting** and **Reporting Standard (FLW Standard)**.

WHY FOOD WASTE IS SO IMPORTANT

Food waste is one of the most vital social, economic, and environmental issues facing our planet. In a reality where nearly one billion people are still dying of hunger or have to settle for inadequate nutrition every year, it is unacceptable that over a third of the world's food remains abandoned in fields or ends up in landfills.

Food waste has serious environmental impacts. Today, we know that every product not only generates CO_2 throughout its life cycle but, also has a water footprint that weighs heavily on climate change. Producing food that will never end up on a table means unnecessarily aggravating the health of our planet.

Besides the moral and environment effects, food waste has also results in the decreased social value of food. After years of agricultural industrialisation, the decline in food prices has been unstoppable and this phenomenon has fuelled the hopes of those who believe it would be possible to feed everyone on the planet. Unfortunately, the main result instead has been the loss of people's perception of the real food's value, recognized as the effort necessary to harvest, cultivate and produce it.

"Every day, all of us are careful not to waste what we attribute value to, and yet, we waste a lot of food. This is not only due to logistics problems.
The reason should be sought in a cultural change that has relegated a primary good, as food, to the role of a generic commodity."

GUIDO BARILLA
Chairman Barilla Group and Chairman Barilla Center for Food and Nutrition Foundation

SUMMARY

Barilla has analyzed the entire life cycle - excluding the consumption phase - of the tomato used for the production of **Barilla Basilico sauce**, by analyzing only the main ingredient, **tomato pulp and concentrate**, which represent **86%** (344 g) of the weight of the 400g package. It has been discovered that this supply chain is a good example of circular economy.

Compared to the total 400 g of Barilla Basilico sauce, the **loss** of food **in the field** is **11%** due to the selection of quality during the harvesting phase, while during the loading, unloading and **transport phases** the loss of food amounts to **1%**.
The loss generated during the **tomato pulp and concentrate production** amounts to **4.35%** while during the **Barilla Basilico sauce production** amounts to **3.63%**.

In addition, the research conducted by Last Minute Market showed that food losses during the **distribution and retail phase** amounted to around **0.28%**.

TOTAL FOOD LOSSES AND WASTE (FLW)

344 g
Tomato Pulp and Concentrate

80.5 g
Food losses and waste

PRODUCT ANALYSED
Barilla Basilico Sauce 400g produced in Italy

LIFECYCLE STAGE(S)
Entire tomato sauce supply chain, excluding other ingredients and the consumption phase

FLW **80.5** g

For 344 g of tomato pulp and concentrate necessary for the 400 g Barilla Basilico Sauce:

COMING FROM

79.54g **98.8%** | 0.96g **1.2%**

CULTIVATION	TRANSPORT	TOMATO PULP AND CONCENTRATE PRODUCTION	SAUCE FACTORY	RETAIL
57.8%	4.7%	20.2%	16.1%	1.2%

COMPOSED BY

64.27g **79.8%**
FOOD - EDIBLE PARTS
green, sick, rotten, crushed, broken, wrong labelling, recipe errors, problems during stocks

16.23g **20.2%**
INEDIBLE PARTS
peels, seeds, inert waste

ENDING IN

VALORIZED 85.6%

FOOD BANK	LEFT IN FIELD	ANIMAL FEED	ENERGY RECOVERY

LANDFILL DISPOSAL 14.4%

- TOMATO TRANSPORTS
- PULP AND CONCENTRATE PRODUCTION WASTE
- RETAIL UNSOLD

BARILLA BASILICO SAUCE

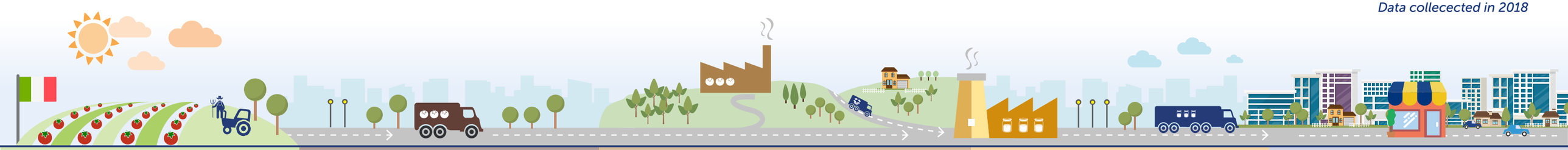
400g

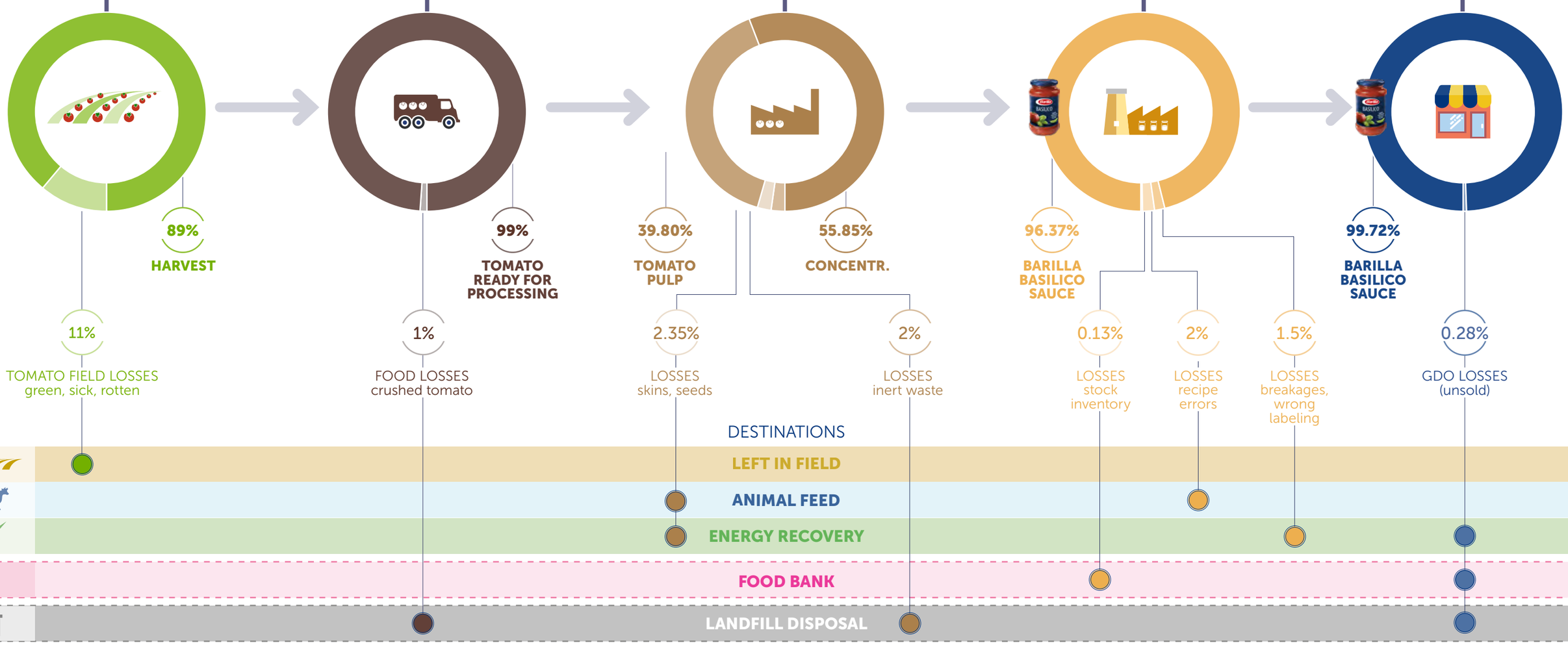
Product, Co-product and Waste from cultivation to retail

TOMATO FOR THE BASILICO SAUCE FOOD LOSSES AND WASTE

Field Losses	Transport Losses	Pulp and concentrate Production	Barilla Barilico Sauce	Retail Losses
11%	**1%**	**4.35%**	**3.63%**	**0.28%**

The percentage are calculated on 400g package of Barilla Basilico Sauce
Data collecected in 2018





METHODOLOGY

Food Loss + Waste PROTOCOL

www.flwprotocol.org

The reference standard used for this analysis was the global Food Loss and Waste Accounting and Reporting Standard (FLW Standard).

"The Food Loss and Waste Accounting and Reporting Standard (or FLW Standard) is a global standard that provides requirements and guidance for quantifying and reporting on the weight of food and/or associated inedible parts removed from the food supply chain—commonly referred to as "food loss and waste" (FLW). Using the standard enables countries, cities, companies, and other entities to develop inventories of how much FLW is generated and where it goes. The FLW Standard is designed to allow for the fact that different organizations will have different reasons for quantifying FLW. These different goals lead to (or government regulations may even explicitly state) different definitions of what constitutes FLW. The FLW Standard is designed to allow for the fact that different organizations will have different reasons for quantifying FLW. These different goals lead to (or government regulations may even explicitly state) different definitions of what constitutes FLW. The FLW Standard, therefore, defines the possible components of FLW in terms of the possible material types (i.e., food and/or associated inedible parts) and destinations (where material removed from the food supply chain is directed—see Figure 1). It allows an entity to select which combination of material types and destinations it considers to be "food loss and waste," in accordance with the entity's stated goals". "The FLW Standard provides a credible, practical, transparent, and internationally consistent basis for entities to account for and report on FLW. An FLW inventory must meet a number of requirements to be in conformance with the standard; these requirements are listed in Table 3 at the end of this executive summary. The full document provides guidance on implementing these requirements, as well as additional recommendations."

Regardless of the particular scope selected, the FLW Standard requires an entity to report on four components: **Timeframe**: the period of time for which the inventory results are being reported.
Material type: the materials that are included in the inventory (food only, inedible parts only, or both).
Destination: where FLW goes when removed from the food supply chain.
Boundary: the food category, lifecycle stage, geography, and organization.

FIGURE 1 I Material types and possible destinations under the FLW standard

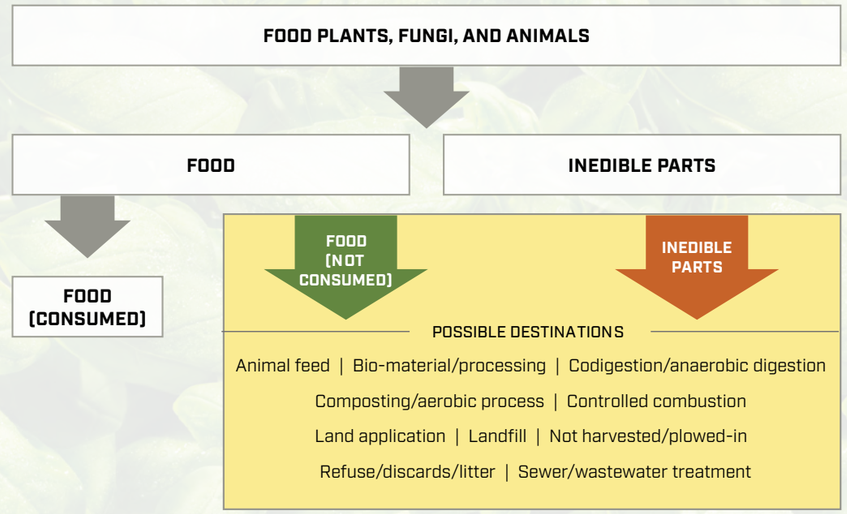
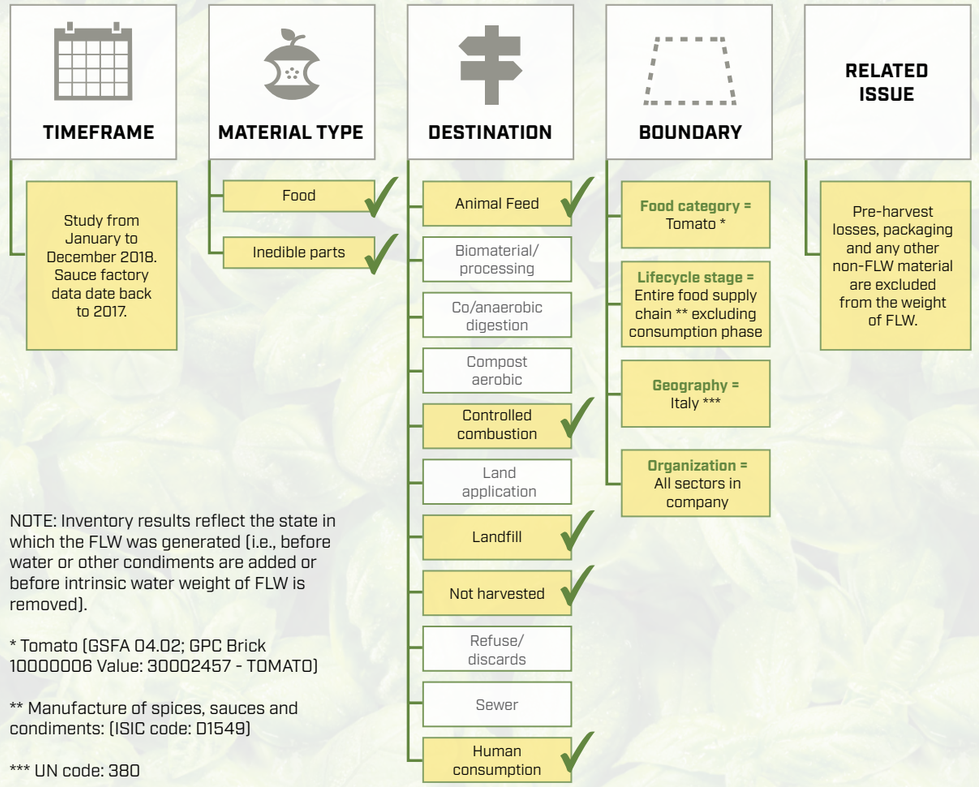


FIGURE 2 I Scope of an FLW Inventory



SCOPE AND RESULTS

The study was conducted analyzing the FLW of only the main ingredients, tomato pulp and concentrate, which correspond to 344 g (86%) of the 400g Barilla Basilico Sauce package. The other ingredients (basil, onions, water, oil, salt, sugar and flavours) are of secondary importance and were therefore excluded from the analysis. The scope of this FLW inventory is quantify the loss and waste in tomato sauce production (pulp + concentrate) and the study was conducted by analysing the life cycle, excluding consumption phase.

EXCLUSIONS AND RELATED ISSUES

- Packaging and any other non-FLW material have been EXCLUDED from inventory results.
- Inventory results reflect the state in which the FLW was generated (i.e., before water or other condiments are added or before intrinsic water weight of FLW is removed).
- Pre-harvest losses have been EXCLUDED from inventory results because they are not relevant for the purpose of this study.

PRODUCT
Barilla Basilico Sauce 400 g.

TIMEFRAME
The study began in January 2018 and ended in December 2018. Data relevant to sauce factory date back to 2017.

MATERIAL TYPE
The **total weight of the FLW** has been quantified in **80.5 g** for 344 g of tomato pulp and concentrate necessary to produce a bottle of 400 g of sauce. The total is the sum of the **Food (edible part) 64.3 g** ("Food" Refers to any substance-Whether processed, semi-processed, or raw that is intended for human consumption), and **inedible parts** ("Inedible parts" Refers to components associated with a food that, in food supply chain, are not intended to be consumed by humans) **16.2 g**.

DESTINATION
As "destination" we indicate where the material removed from the food supply chain is directed.

BOUNDARIES
We analysed the boundary of the FLW inventory in terms of the food category, lifecycle stage, geography and organisation.

DESTINATION	Weight of FLW (in grams)	%
Human consumption	0.6	0.7 %
Animal feed	11.7	14.5 %
Energy Recovery	10.0	12.5 %
Landfill	11.6	14.4 %
Not harvested/plowed-in	46.6	57.9 %
Total FLW	**80.5g**	**100 %**

BOUNDARY	
Food category (ies)	Tomato: GSFA 04.02; GPC Brick 10000006 Value: 30002457 - TOMATO
Lifecycle stage (s)	Entire food supply chain, excluding consumption phase. Manufacture of spices, sauces and condiments: ISIC code: D1549
Geography	Italy UN code: 380
Organisation	All sectors in the company

METHODS AND DATA SOURCES

Date have been collected by:

- **Barilla G&R F.lli S.p.A.,** which supply data and information concerning the processes of cultivation, transport, pulp and concentrate production and factory.

- **Last Minute Market – Impresa Sociale Srl**, accredited spin-off of the University of Bologna, which elaborated data and provided data about distribution.

In regard to the **cultivation stage**, we analysed documented research which provided an overview about field loss, particularly during the harvest stage. Through the comparison of various studies, we estimated the average field loss for tomato. In particular, we consulted a study about loss in primary production conducted by Barilla.

In regard to the **transport stage**, we consulted the data possessed by Barilla.

In regard to the **processing stage (pulp and concentrate production and sauce factory)**, we referred to data provided by Barilla and by the Italian primary and secondary processing plants that were taken into consideration.
In regard to **distribution**, we referred to data provided by Italian retail establishments.

The data were collected by LMM through a survey conducted in 6 brands of the Italian large-scale distribution. The resulting data, useful for our analysis, were provided by five of these six companies. They refer to 1,700 points of sale, representative of the categories present in the Italian territory, from small supermarket to larger hypermarket. The data was obtained from the arithmetic average of the data referred by the five companies.

DATA SOURCE

- **Consorzio Casalasco del Pomodoro, Ferrara Food, Emiliana Conserve** and **Copador** for tomato production data
- **Naturello** for semi-finished basilico data
- **Barilla factory of Rubbiano**
- **Last Minute Market** for retail

REFERENCES

- www.eu-fusions.org
- www.fao.org
- www.theconsumergoodsforum.com
- web.unep.org
- www.wbcsd.org
- www.wrap.org.uk
- www.wri.org

CAUSES OF FOOD LOSS AND WASTE

The causes of FLW are due to several factors, but in general the amount of FLW produced for 344 g of pulp and concentrate the are necessary to produce a bottle of 400 g of sauce is very low, considering also that **85.6% of the total is valorized into alternative sectors**.

FLW TYPE	Weight g	% FLW on the whole	CAUSE	ADDITIONAL NOTES
Cultivation green, sick and rotten tomatoes	46.59	57.8%	Quality standardization	Unripe tomatoes and out of quality standards (sick, rotten).
Transport crushed tomatoes	3.77	4.7%	Crush	Weight loss caused by crushed tomatoes inside trailer during filling phase.
Pulp and Concentrate production skins and seeds	8.77	10.9%	Cleaning and selection	Tomatoes before being transformed into pulp undergoes a process that allows the removal of seeds, green parts and skins.
Pulp and Concentrate production inert waste	7.46	9.3%	Cleaning and selection	During the washing and sorting phase, the machinery separates the inert materials from the tomato that will be transformed into pulp.
Sauce factory pulp + concentrate	5.35	6.6%	Breakages, incorrect labelling	Tomato pulp disposed of together with aseptic sacks, sauce that is disposed of due to breakage and wrong labeling.
Sauce factory pulp + concentrate	7.14	8.9%	Recipe errors	Sauce scrap removed from the tubular pasteuriser (physiological waste), recipe errors.
Sauce factory pulp + concentrate	0.46	0.6%	Stocks	Product no longer salable because it has exceeded the deadline for the sale.
Retail unsold pulp + concentrate	0.96	1.2%	Damage	In retail store, the main cause of waste is the breaking or damaging of packaging, which makes the sauce unsellable. Sauce is, in fact, an easily preserved and long term product.
TOTAL FLW	**80.50**	**100 %**		

All the FLW data, from the production of Barilla sauce onwards, refer to the main ingredients analyzed (tomato pulp + concentrate) which account for 86%, as well as 344g on 400g.

INVENTORY RESULTS

The following table shows FLW by food category and lifecycle stages.

In regard to the **edible parts** of the FLW, amounting to **79.8 %** of the total losses, we see that the FLW mainly occurs in the cultivation stage.

During the **primary** and **secondary production stages** (pulp and concentrate production + sauce factory), the FLW is limited to a **20.1 %** of the edible parts. More important, almost all the FLW of the edible portion during the production stage is used in alternative productions, such as that of animal feed, energy recovery and food bank.

Lifecycle stage	Material type removed from food supply chain	Total of all food categories [g]	% on total FLW	% on total edible part	Product
1. Tomato cultivation	Food + associated inedible parts	46.59	57.8 %		
	Food only	46.59		72.5 %	Tomato
	Inedible parts only	0			
2. Transport	Food + associated inedible parts	3.77	4.7 %		
	Food only	3.77		5.9 %	Tomato
	Inedible parts only	0.00			
3. Pulp and concentrate production	Food + associated inedible parts	16.23	20.2 %		
	Food only	0.00		0 %	Tomato
	Inedible parts only	16.23			
4. Sauce factory	Food + associated inedible parts	12.95	16.1 %		
	Food only	12.95		20.1 %	Sauce
	Inedible parts only	0.00			
5. Retail and markets	Food + associated inedible parts	0.96	1.2 %		
	Food only	0.96		1.5 %	Sauce
	Inedible parts only	0.00			
TOTAL ALL LIFECYCLE STAGES	**Food + associated inedible parts**	**80.5**	**100.00%**		
	Food only	**64.27**	**79.8%**	**100 %**	
	Inedible parts only	**16.23**	**20.2%**		

All the FLW data, from the production of Barilla sauce onwards, refer to the main ingredients analyzed (tomato pulp + concentrate) which account for 86%, as well as 344g on 400g.

TOMATO SAUCE SUPPLY CHAIN: LOSSES AND WASTE

Each 344g of sauce, used in the 400 g package, produces **80,5 g of losses and waste**.
It's important to analyse the composition and causes of FLW.

Composition of FLW: Food and inedible parts

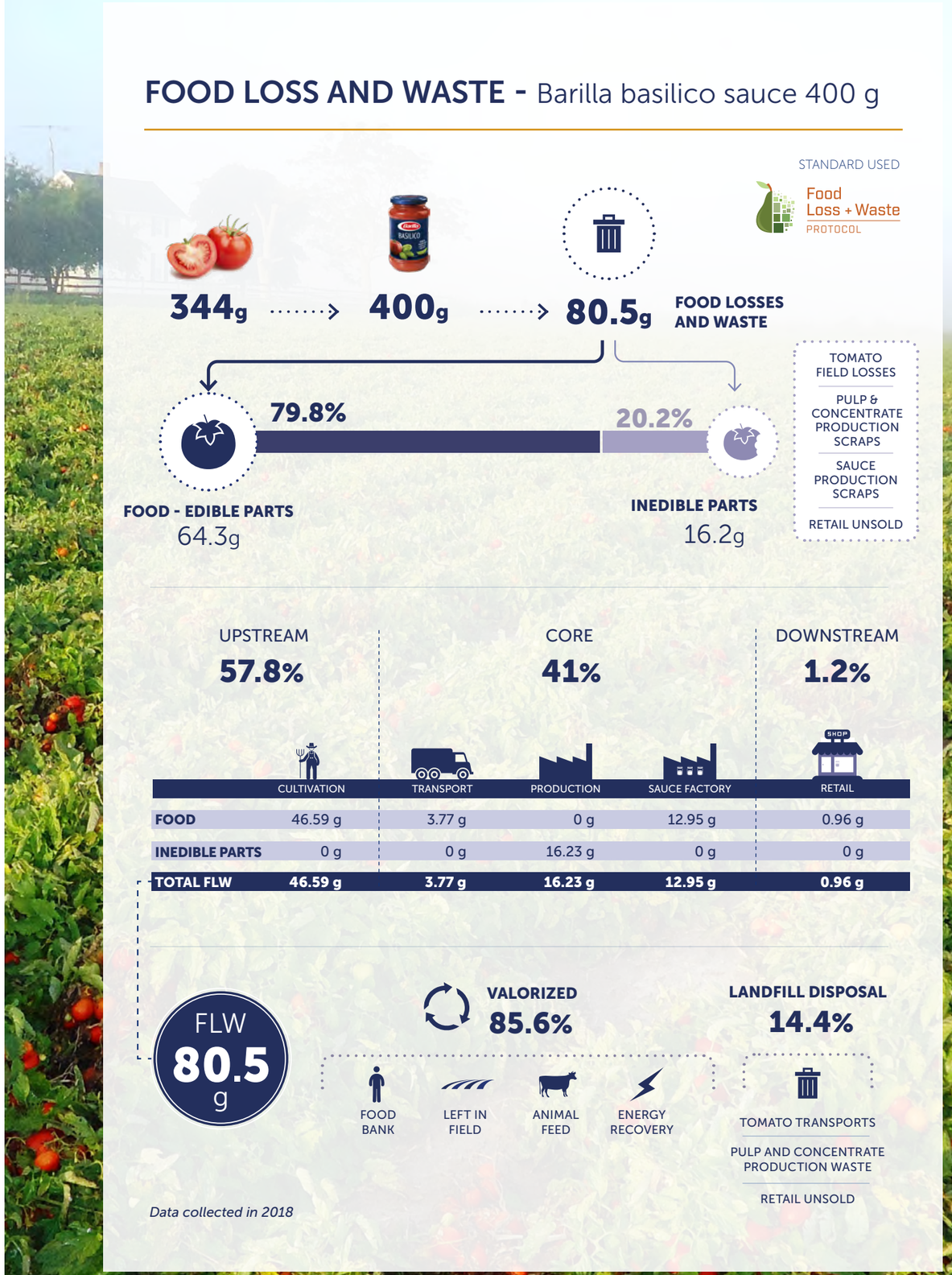
Along the supply chain **20,2%** of all FLW consist in **inedible parts**, created only during the production of pulp and tomato concentrate.
The remaing **79,8%** are considered **edible parts (named food)**, mainly wasted in cultivation stage (57.8 % of the edible part).

Where are FLW allocated in the chain

98,8% of all FLW are allocated in the **previous stages to** the **distribution, 1.2%** in the final part of the supply chain, **in distribution phase**.

Destinations of FLW: An example of circular economy

85,6% of the total of FLW is used into **alternative sectors** while only **14.4%** is destined to **landfill disposal**. In particular considering alternative destinations, we have **14.5%** of total FLW used for **animal feed and care, 57.8% not harvested, 12.5% recover** for **energy**, and **0.7%** for **human consumption**.



BARILLA CANTEEN'S PROJECT TO REDUCE FOOD LOSS AND WASTE

A reseach by Last Minute Market on domestic waste in the Italian households *(www.sprecozero.it)*, shows that in Italy the **total food waste** is worth over **€ 15 billion** and **what we throw into homes**, **canteens** and **restaurants** represents **4/5 (€ 12 billion) of the total** .

Awarness about this issue, **Barilla** has started in **March 2018** a **pilot project**, called **Winnow**, for **measuring** and **minimizing waste** of the catering service in its **Pedrignano office restaurant's**.

BARILLA'S WINNOW PROJECT

Winnow project has been implemented in collaboration with the catering partner **Felsinea Ristorazione** and with the technological support from the English company **Winnow**.

The project concerns the use of a tablet for the **measurement** and **analysis** of **food waste** and the **implementation** of a **special routine**: Felsinea staff **throws** food **waste** into a dedicated bin and **registers** the **weight** and **type** of food waste via the digital tablet directly connected to Winnow's system that records all the information and create **daily reports** showing waste trends in the time. By analysing reports and trends Felsinea staff can understand what are the food **waste main causes, improvement** areas to work on and the **action** plan to adopt.

Thanks to this project the canteen's staff is now more aware and able to focus on **specific improvement areas**.

THE RESULTS

By implementing the project's routine Felsinea has **saved from waste**, in the period from March 2018 to December 2019, **4.800 kg of food**, equivalent to **11.946 meals** and **21.000 kg of CO_2 eq**. The largest amount of food waste has been recorded in the meal preparation phase and in the end of service returns. For these reasons Felsinea is working for **reducing waste during meal preparation phase** and is implementing strategies to **increase customer awareness**.

Thanks to the great results obtained Barilla is planning to **expand the project** to other Company's canteens in its Italian plants aiming to reduce food waste.

BARILLA PEDRIGNANO CANTEEN'S FOOD WASTE REDUCTION PROJECT

HOW DOES IT WORK

The canteen's routine implemented with the project consists of simple steps:

FOOD SAVED FROM WASTE

In 22 months the project the project has allowed to save from waste

21.000 kg CO_2 eq

4.800 kg of food

≈12.000 meals

PROJECT'S PARTNERS

FELSINEA RISTORAZIONE
www.felsinea.it

Felsinea Ristorazione is an Italian company that provides catering services for over 40 years. It is specialized in corporate catering and offers its service in most of Barilla italian plants' canteens.

winnow
www.winnowsolutions.com

Winnow is an English company that builds artificial intelligence tools to help chefs run more profitable and sustainable kitchens by cutting food waste. They develop digital tools that provide data to drive improvements in kitchen production processes and reduce environmental footprint.

BARILLA GROUP

Barilla is an Italian, family-owned food company. Established in 1877, it's now an international group present in more than 100 countries. A world leader in the markets of pasta and ready - to - use sauces in continental Europe, bakery products in Italy and crispbread in Scandinavia, the Barilla Group is recognised worldwide as a symbol of Italian know–how.

Contact person
Luca Ruini - Luca.Ruini@barilla.com
www.barillagroup.com

BARILLA CENTER FOR FOOD & NUTRITION FOUNDATION

The Barilla Centre for Food & Nutrition Foundation (BCFN) is a multidisciplinary foundation that produces scientific content about food and nutrition, health and sustainability.

www.barillacfn.com

LAST MINUTE MARKET SRL

Last Minute Market is an accredited academic spin-off of the University of Bologna engaged in waste reduction and prevention. Active for more than 15 years, it operates with enterprises and public administrations across Italy ideating, implementing and monitoring recovery projects. Unsold (not for sale, but still edible) goods are donated to charities. LMM is also doing research, training and food waste analysis. It also promotes initiatives aimed at raising public, private and governmental awareness on waste issues. LMM started in 1998 as a research project by the Department of Agricultural Economics and Engineering of the University of Bologna, testing new practices of the social valorisation of the copious amount of unsold, fresh food that supermarkets dispose daily.

Contact person
Matteo Guidi - matteo@lastminutemarket.it
www.lastminutemarket.it

www.barillagroup.com