

# BARILLA FOOD LOSS AND WASTE REPORT

## BARILLA BLUE BOX PASTA 1Kg



STANDARD USED

REPORT BY



Food  
Loss + Waste  
PROTOCOL



**Barilla**  
The Italian Food Company. Since 1877.





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# INTRODUCTION



[www.gruppobarilla.it/bg.com](http://www.gruppobarilla.it/bg.com)



people, environment, science, economy

[www.barillacfn.com](http://www.barillacfn.com)



[www.lastminutemarket.it](http://www.lastminutemarket.it)



[www.flwprotocol.org](http://www.flwprotocol.org)

Aware of the urgency emerging from the Barilla Center for Food & Nutrition Foundation studies and in line with its purpose **“Good for You, Good for the Planet”** ([www.barillagroup.com/en/our-responsibility](http://www.barillagroup.com/en/our-responsibility)), Barilla, as a 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.

Its goal is to monitor the food losses and waste all along the value chains, identifying the causes and the measures to reduce them. The reference standard used for this analysis is the global **Food Loss and Waste Accounting and Reporting Standard** (FLW Standard).

*This document refers to Barilla Blue Box Pasta.*





# WHY FOOD WASTE IS SO IMPORTANT

Food waste is one of the most significant social, economic, and environmental issues facing our Planet.

At a time in history 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<sub>2</sub> 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 our Planet's health. Besides the moral and environmental effects, food waste also results in the decreased social value of food. After years of agricultural industrialisation, the decline in food prices has been relentless.

This phenomenon has fuelled the hopes of those who believe it would be possible to feed everyone on the Planet. Unfortunately, the main result has rather been the loss of people's perception of food's real value, that is to say, the effort it takes to produce, cultivate and harvest food.



*"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

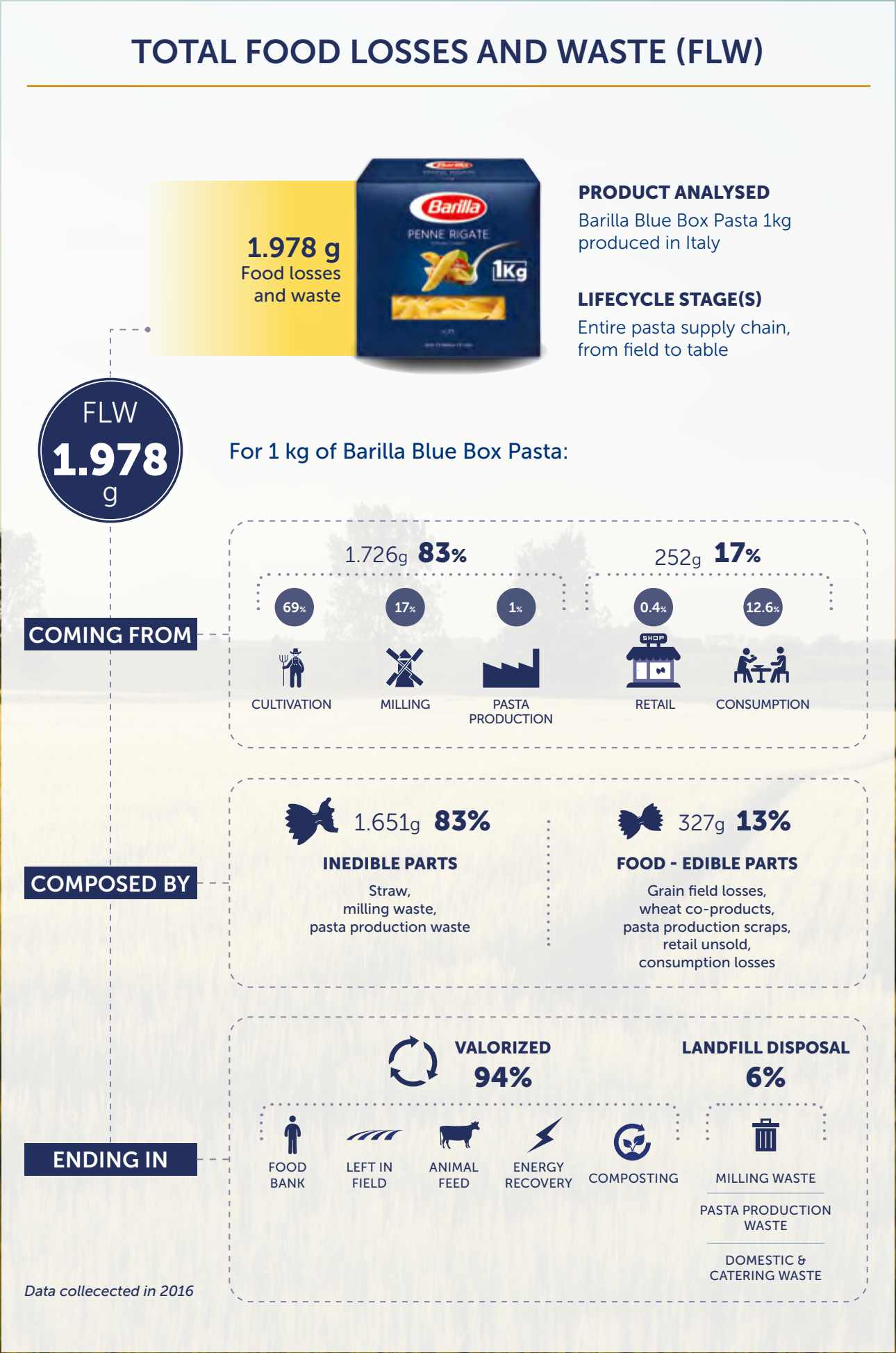


# SUMMARY

Barilla, analysed the entire life cycle - from field to table - of the **pasta** that it produces in Italy. It has been found that this supply chain is an example of a true circular economy, where almost nothing is lost.

Food **loss in the field** is very limited (**less than 2%** due to grain losses), while the straw obtained during the harvest—weighing the same as wheat—is usually used as animal feed and for litter. **Loss** generated during the **grinding** of the grain and the pasta production amounted to **around 2%**.

However, the research carried out has shown that the **greatest waste** is concentrated in the **consumption phase**. In fact, according to research by Barilla and Last Minute Market, the **product wasted** at the **final level** (household and hospitality sectors) amounted to between 10% and 40%, especially in school catering with an **average value 25%**.





# BARILLA BLUE BOX PASTA

A GOOD EXAMPLE OF CIRCULAR ECONOMY

Product, Co-product and Waste



## PASTA LOSSES AND WASTE



Field Losses

2%



Milling & Production Waste

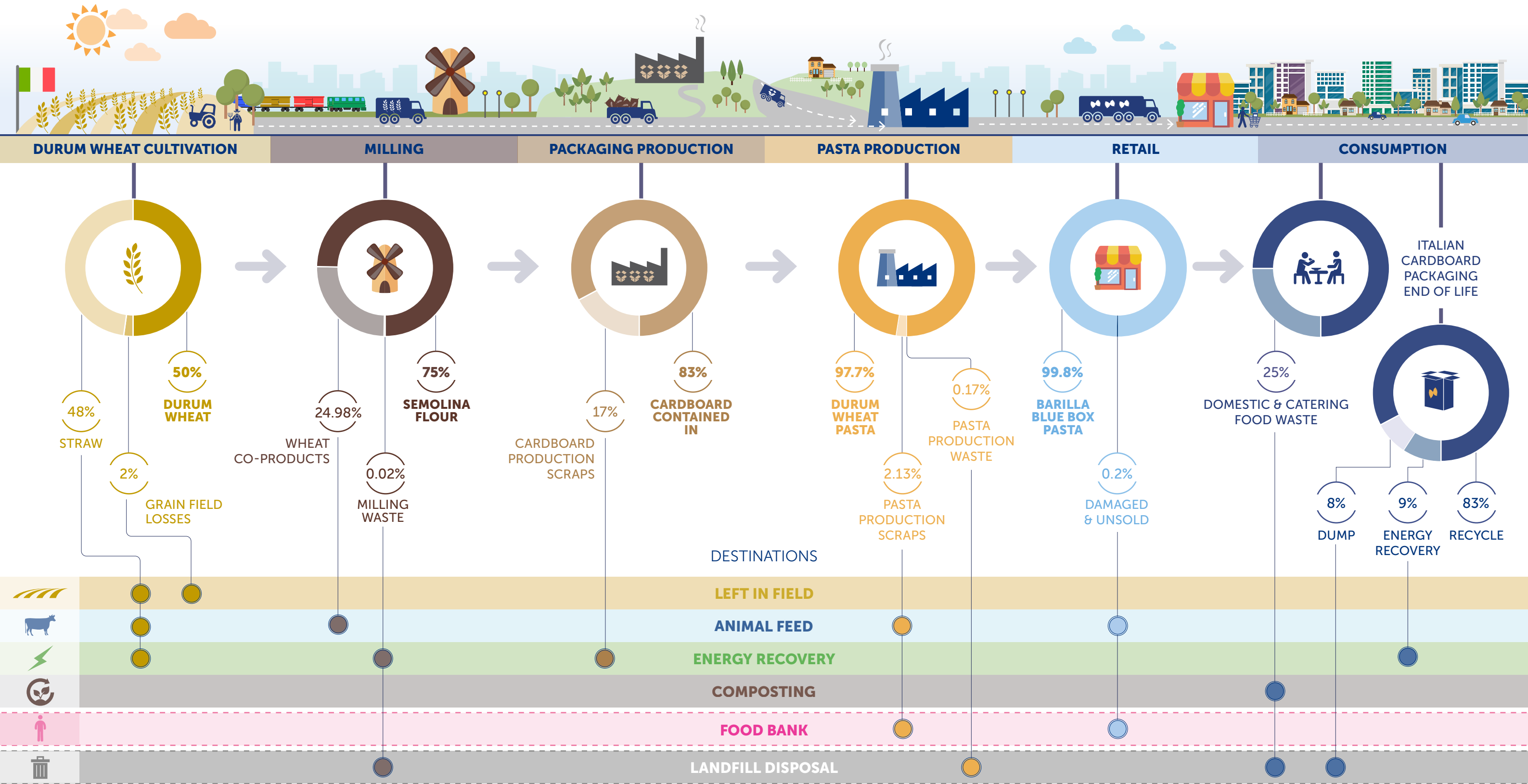
2.3%



Consumers & Catering food waste

25%

percentage is referred to each single phase of the Supply Chain  
Data collected in 2016





# METHODOLOGY



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 | Material types and possible destinations under the FLW standard

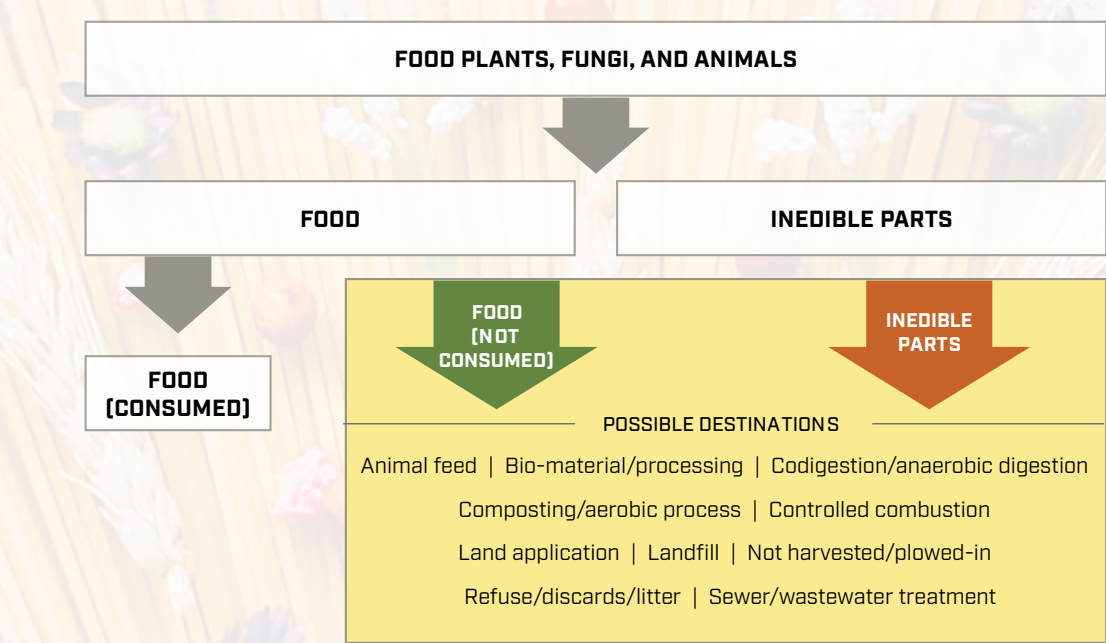
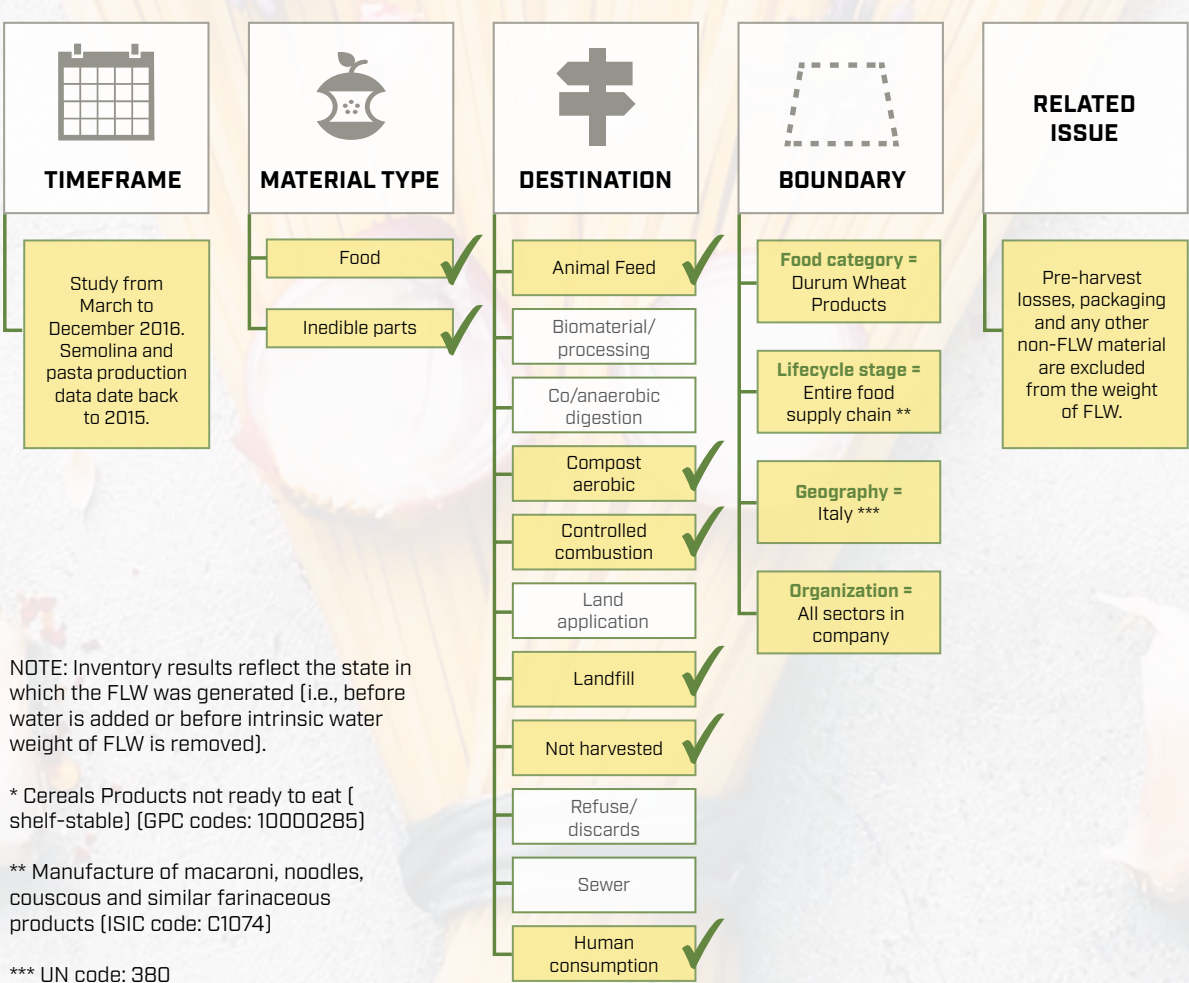


FIGURE 2 | Scope of an FLW Inventory





# SCOPE AND RESULTS



The study was carried out by analysing the FLW of the life cycle of the Barilla Blue Box which contains 1 kg pack of pasta of different shapes.

The scope of this FLW inventory is the quantification of loss and waste from field to fork for the production of 1 kg of Barilla pasta.

## 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 is added or before intrinsic water weight of FLW is removed).
- Pre-harvest losses have been EXCLUDED from inventory results.

### PRODUCT

Barilla Blu Box 1 kg.

### TIMEFRAME

The study began in March 2016 and ended in December 2016. Data relevant to semolina and pasta production date back to 2015.

### MATERIAL TYPE

The total weight of the FLW has been quantified in **1.98 kg** for 1 kg of pasta produced. The total is the sum of the **food (0.33 kg)** and the **inedible parts (1.65 kg)**. “Food” refers to any substance—whether processed, semi-processed or raw—that is intended for human consumption. “Inedible parts” refer to components associated with food that, in the food supply chain, is not intended to be consumed by humans.

### 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 g	%
Human consumption	1,3 g	0.07 %
Animal feed	797,1 g	40.28 %
Composting/aerobic processes	126,7 g	6.41 %
Not harvested/plowed-in	490,7 g	24.80%
Energy Recovery	436,3 g	22.05 %
Landfill	126,7 g	6.40 %
Total FLW	1.978,8 g	100 %

BOUNDARY	
Food category (ies)	Cereals Products – Not Ready to Eat (Shelf Stable) (GPC codes: 10000285)
Lifecycle stage (s)	Entire food supply chain. Manufacture of macaroni, noodles, couscous and similar farinaceous products (ISIC code: C1074)
Geography	Italy UN code: 380
Organisation	All sectors in the company



# METHODS AND DATA SOURCES

Data have been collected by:

- **Barilla G.&R. Fratelli SpA**, which supplied data and information concerning the processes of cultivation, milling, pasta production and consumption.
- **Last Minute Market Srl**, accredited spin-off of the University of Bologna, which provided data about distribution and consumption.
- **Ergo Consulting Srl**, accredited spin-off of University of Bologna and Agricultural Sciences Department - DipSA (Alma Mater Studiorum, University of Bologna), which collected data about the cultivation stage.

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 durum wheat.

In particular, we consulted 2011 FAO's "Global Food Losses and Food Waste" and a study about loss in primary production conducted by Barilla. In regard to the **processing stage** (milling and pasta production), we referred to data provided by Barilla and by the Italian primary and secondary processing plants that were taken into consideration.

The data were specifically collected from three mills for the primary processing and from two production plants for the secondary processing. In regard to **distribution**, we referred to data provided by Italian retail establishments. The data were collected by LMM through a survey conducted in 5 brands of the Italian large-scale distribution. The resulting data, useful for our analysis, were provided by four of these five 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 referring to the last stage of the production, the **consumption**, derive from a number of sources. Specifically, for the data regarding domestic waste includes: a research conducted by Barilla, Project Europe Fusions ([www.eu-fusions.com](http://www.eu-fusions.com)), Global Food Losses and Food Waste by Fao (2011), Monitoring Centre for domestic waste in Italian families by Last Minute Market (Waste Watcher).

For data regarding public catering, especially school catering, we looked at research conducted by Last Minute Market in various Italian towns, as well as the study conducted by Oricon (Monitoring Centre for mass catering and nutrition) and ANGEM (National Association for mass catering and various services) on the food waste in Italian schools.

## DATA SOURCE

- Orta for cultivation data
- Barilla Mills of Altamura, Castelplanio & Ferrara
- Barilla plants of Pedrignano & Foggia
- Last minute Market for retail and consumption data

## REFERENCES

- [www.eu-fusions.org](http://www.eu-fusions.org)
- [www.fao.org](http://www.fao.org)
- [www.theconsumergoodsforum.com](http://www.theconsumergoodsforum.com)
- [web.unep.org](http://web.unep.org)
- [www.wbcsd.org](http://www.wbcsd.org)
- [www.wrap.org.uk](http://www.wrap.org.uk)
- [www.wri.org](http://www.wri.org)



# CAUSES OF FOOD LOSS AND WASTE

The causes of FLW are to due to a number of conditions, especially regarding the production process we consider below. For example, when we analyse the wheat cultivation process, the straw production is an inevitable part and is, therefore, considered a 'joint' production. In order to produce a certain amount of grain, straw will inevitably be produced as well. The straw produced during the cultivation stage will not be discarded, but utilised as litter and animal feed.

FLW TYPE	Weight g	% FLW on the whole	CAUSE	ADDITIONAL NOTES (REQUIRED IF CAUSE AND/OR DRIVER IS UNKNOWN)
Cultivation - Straw	1 308.43	66.13 %	Physiological	Joint production. Specifically, in order to produce a certain amount of grain, a certain amount of straw is produced. (Physiological process)
Cultivation - Field losses	54.52	2.76 %	Combine harvester failure	By using the best technology available and maximising the performance, it is not possible to have an increase of the amount of the harvested wheat.
Milling - Wheat co-products	340.46	17.21 %	Milling	Joint production. Specifically, in order to produce a certain amount of semolina, a certain amount of bran is produced and used in alternative production, especially animal feed.
Milling waste	0.27	0.01 %	Wheat pre-cleaning	The pre-cleaning plant removes the impurities before the wheat is stocked in the silos. These losses are partially used for animal feed. Their non-edible parts are disposed as waste.
Pasta production scraps	20.47	1.03 %	Equipment cleaning	The FLW in this stage of production is mainly the consequence of the production lines' cleaning and changing of pasta shapes, not usable for human consumption.
Pasta production scraps	1,33	0.07 %	Equipment cleaning	The FLW in this stage of production is mainly the consequence of the production lines' cleaning and changing of pasta shapes, still edible.
Pasta production waste	1.74	0.09 %	Transport, packaging	Mostly pasta fallen on the ground (unsuitable for animal feed) happens for different reasons, i.e. filling of mobile silos, emptying of mobile silos, packaging and transport of unpackaged pasta.
Retail unsold	2.00	0.10 %	Damage	In retail situations, the main cause of waste is the damaged packaging, which makes the pasta unable to be sold. Dry pasta is, in fact, an easily preserved and long term product.
Consumption	249.50	12.61 %	Cooked Too large servings Disliked	In the domestic environment, dry pasta (before cooking) is the least wasted product, due to the fact is shelf stable. After cooking though in Italy it is at the top of the list of the most wasted foods. In most cases, the main cause is the excessive amount of portions. In school catering, the various studies suggest a waste of the pasta dishes ranging from 10% to 40%. This variability is mainly due to the appreciation of the sauce more than of the pasta itself. 50% of the waste in the consumption stage is destined to composting, the other 50% to landfill disposal. Furthermore FAO estimates 25% the waste of cereals at the consumption level in Europe.
Total FLW	1 978.73 g	100 %		



# INVENTORY RESULTS

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

In regards to the **edible parts** of the FLW, which amount to only **16,57%** of the total loss, we see that the FLW mainly occurs in the consumption stage. **Consumption** accounts for **12.61%** of **total FLW**; when only **edible parts** are considered, this stage reaches over **76.11%**.

During the **primary** and **secondary production stages** (mill and pasta factory), the FLW is limited to a **6.65%** of the **edible parts**.

More important, almost all of the FLW of the edible parts during the production stage is used in alternative productions, such as animal feed. On the other side, when considering the FLW in domestic context and public catering (excluding rare occasions of recycled surplus for social purposes), the FLW is inevitably disposed.

Lifecycle stage	Material type removed from food supply chain	Total of all food categories g	% on total FLW	% on total edible part	Product
1. Durum wheat cultivation	Food + associated inedible parts	1362.95	68.88	16.63	Grain
	Food only	54.52			
	Inedible parts only	1308.43			
2. Milling	Food + associated inedible parts	340.73	17.22	0.00	Flour
	Food only	0			
	Inedible parts only	340.73			
3. Pasta product.	Food + associated inedible parts	23.54	1.19	6.65	Pasta
	Food only	21.80			
	Inedible parts only	1.74			
4. Retail and markets	Food + associated inedible parts	2	0.10	0.61	Pasta
	Food only	2			
	Inedible parts only	0			
5. Consumption	Food + associated inedible parts	249.5	12.61	76.11	Pasta
	Food only	249.5			
	Inedible parts only	0			
TOTAL ALL LIFECYCLE STAGES	Food + associated inedible parts	1.978	100%	100%	
	Food only	327	17%		
	Inedible parts only	1.651	83 %		



# PASTA SUPPLY CHAIN: LOSSES AND WASTE

Each kg of pasta produces **1.98 kg** of losses and waste. Is important to analyse the composition and causes of FLW to identify corrective actions. In this study, we included **edible** and **inedible parts** of FLW, and the overall results are deeply influenced by the inedible part, consider that only at the production stage we have almost 50% of straw losses.

## Composition of FLW: food and inedible parts

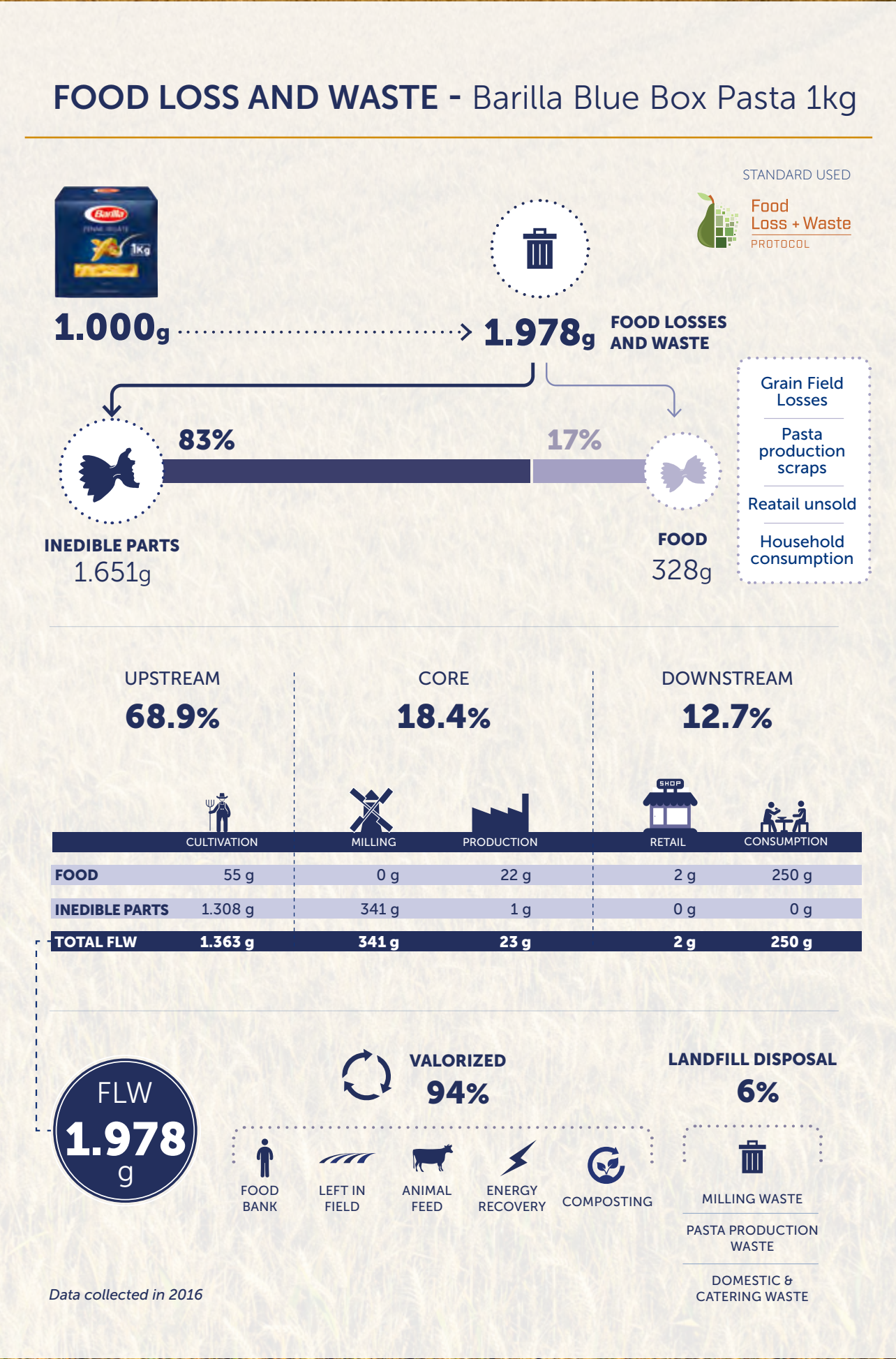
Along the supply chain **83%** of all FLW consist in **inedible parts**, mainly related to physiological issues, as **straw (66%)**, and a small part during milling and pasta production stages. Only 17% are considered ad **edible parts**, mainly wasted in **consumption stage (76%** of all **edible part**).

## Where are FLW allocated in the chain

**87%** of all FLW are allocated in the **previous stages** to the **distribution**, **13%** in the final part of the supply chain, in **distribution** and **consumption phase**; However, we must consider that we lose **most edible part** at the **consumption level (76%)**.

## Destinations of FLW: an example of circular economy

94% of the total of FLW is used into **alternative sectors**, while only **6%** is destined to **landfill disposal**. In particular considering alternative destinations, we have **40,3 %** of total FLW used for **animal feed** and **care**, **24,8%** not harvested, **22%** recover for **energy**, **6,4%** composting, and **0,07%** for human consumption.





# TARGETS



In June 2015, The Consumer Goods Forum (CGF) Board agreed on a Food Waste Resolution. The Resolution is a voluntary commitment by CGF members to take steps to prevent and reduce food loss and waste within their own retail and manufacturing operations. The Resolution asks members to:

- 1. First prevent food waste, then maximise its recovery towards the goal of halving food waste within our own retail and manufacturing operations by 2025, versus a 2016 baseline.
- 2. Contribute to the UN goals by 2030<sup>1</sup>:  
To halve per capita global food waste at the consumer level,  
And to reduce food losses along production and supply chains, including post-harvest losses, and maximise the value of the remaining waste.

<sup>1</sup>Based on the UN Sustainable Development Goals on Food Waste adopted by UN Member States in September 2015



With the aim to adhere to this resolution, Barilla has set its goal.

The analysis demonstrated that all along the chain only 6% of all food losses & waste are sent to landfill.

On these very small amounts, Barilla will work with the aim to halve its losses over the next five years.



To achieve this goal Barilla will implement specific projects such as:

 **MILLING**  
Increase waste Energy Recovery

 **PASTA PRODUCTION**  
Reduce pasta scraps

 **DISTRIBUTION**  
Increase food bank use



 **HOME CONSUMPTION**  
Promote leftover pasta recipes

FOOD WASTE TO  
LANDFILL DISPOSAL  
**LESS THAN**

**6%**

We are developing  
project in order  
to halve it



# LEFTOVER PASTA

Among the many features of pasta, its versatility is undoubtedly one of the most important; there are many ways to reuse pasta leftovers. And it is not only remaining pasta that has the possibility to be reused, but other leftovers, such as vegetables or cheeses, can be used in a varied and fun way.

Probably the most widely used, practical and fastest way to make leftover pasta a 'success story' is **"ripassata in padella"**. Upon spreading the pasta evenly on a non-stick pan with a little extra virgin olive oil and leaving it for a few seconds over medium heat, a thin gold layer will form when in contact with the bottom. If the pasta and added sauce of choice are sufficiently united, the result is a nice, crunchy texture throughout. In any case - cohesive or fragmented - when it is served hot, the result is excellent.

A variant to this option is the addition of beaten eggs, so as to create a **"frittata di pasta"** by which you can also add vegetables (cooked or raw) or cubes of cheese. If the remaining pasta is not topped with a full and dense sauce, it can be converted into a tasty **"insalata di pasta"**. Additionally, you can add diced vegetables, olives and herbs.

Optionally, the leftover pasta coated in sauce can be used to form **"crocchette e polpette"**, which, when lightly breaded, can be fried in a pan until a golden crust forms.

To make a **"pasta pasticciata/timballo"**, simply add a light white sauce, fresh diced vegetables and a handful of grated cheese. Mix all ingredients together, pour into a baking dish and put in the oven until the cream has thickened and the top layer forms a golden brown crust or gratin. The result has a rich and delicious impact.

If the pantry should provide small amounts of mixed, uncooked pasta, it is nice to cook different types of pasta simultaneously. Take care to respect the different cooking times of the pastas when putting them into the boiling water. The diversity of the forms will give a nice effect to the finished dish. They can also be lightly chopped so as to accompany **"minestre o zuppe"**.

*Figure: Pasta Omelette*





# LMM FURTHER COLLABORATION



The study of losses and waste along the pasta supply chain shows that most of the edible loss occurs during the stage of consumption.

Considering further the goals of “The Consumer Goods Forum”, the Barilla’s commitment will focus, for the next two years, on the prevention of food loss and waste in the last part of the supply chain.

Barilla and Last Minute Market will focus on the activities that have to do with consumers:

- For don’t forget that in Italian school’s canteens is wasted between 10 and 40% of pasta, a communication projects will be develop;
- Over 50% of food waste originates at home, a study will be carried out for identify the causes of domestic waste;
- Involvement of Barilla employees, through a survey and awareness project.

The Barilla Blue Box pasta loss & waste report will be updated from to years from now.





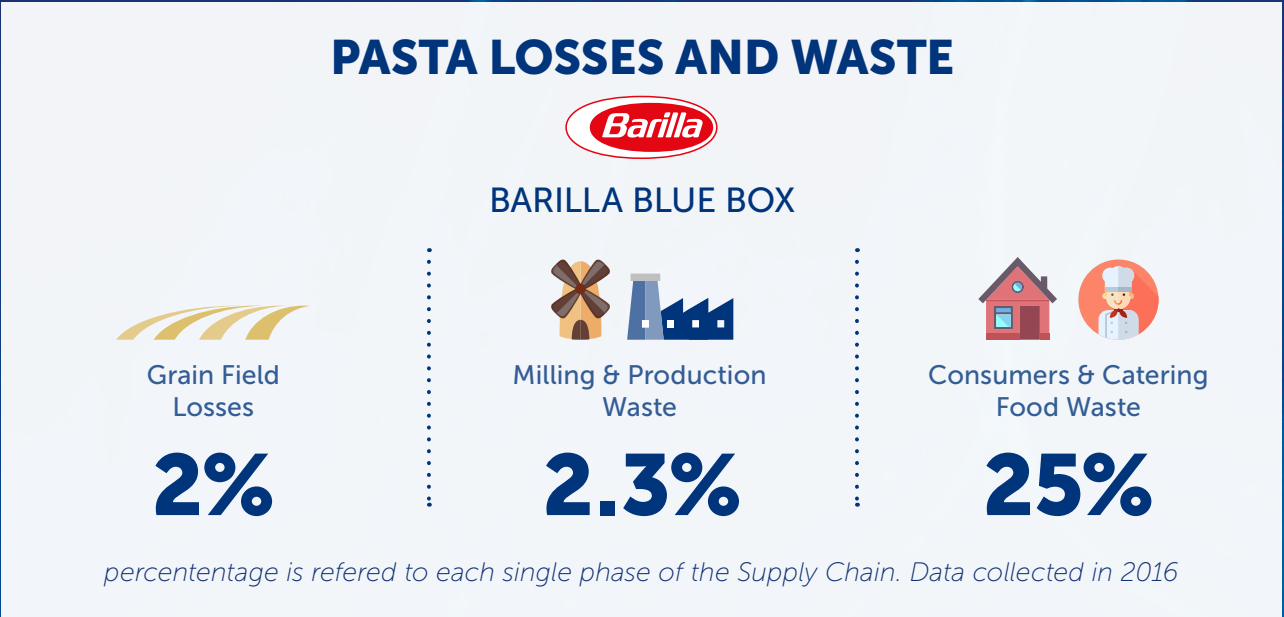
# CONCLUSION

The loss of edible parts (pasta, grain and flour), concern every stage of the production and distribution; waste increases significantly in the last stage, in domestic contexts and mass catering, public and private. A study by Last Minute Market on domestic waste in the Italian households (2013), conducted through the Waste Watcher monitoring centre, indicates that **dry pasta** is the **least wasted product in domestic contexts**, while **cooked pasta** is the **most wasted product among cooked food**.

This information leads to the consideration: on the one hand, pasta is an easily preserved food, easily manageable in domestic contexts; on the other hand, it is the most wasted product when cooked, as it is often prepared in excessive portions.

In **school catering**, where the **average waste** of the **pasta dishes** is about **25%**, the research taken into consideration shows a waste in the main courses ranging from 10% to 40%. From the data provided by Last Minute Market, it can be inferred that the amount of waste depends on the appreciation of the sauce more than on the pasta itself.

Barilla's commitment for the next years is to monitor pasta production, in order to improve measures in the stages by which it is directly involved. In addition, Barilla is committed to promote consumer awareness on waste prevention. It is not to be forgotten that domestic waste in Europe represents over 50% of the total waste of the food supply chain.





## BARILLA GROUP

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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.

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## BARILLA CENTER FOR FOOD & NUTRITION FOUNDATION

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people, environment, science, economy

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](http://www.barillacfn.com)*

## LAST MINUTE MARKET SRL

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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.

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