5.3.2

The raw materials in a pizza

In this chapter, we are focusing on raw materials. We will see that they represent part of manufacturing costs and we will make an initial assessment of their environmental impact.

The term **raw materials** means products extracted from nature in their raw state and that often require transformation before being used. Agricultural products such as wheat, rice and corn are examples of raw materials.

Raw materials can be used to obtain an **end product**. The products on supermarket shelves are end products, the result of a process of transformation and manufacturing that began with one or more raw materials. A pizza, for example, is an end product, ready for consumption, comprising several raw materials.

Five billion pizzas are consumed worldwide every year. That would be enough to cover the whole of Lake Geneva with pizzas, or 70 000 football pitches!

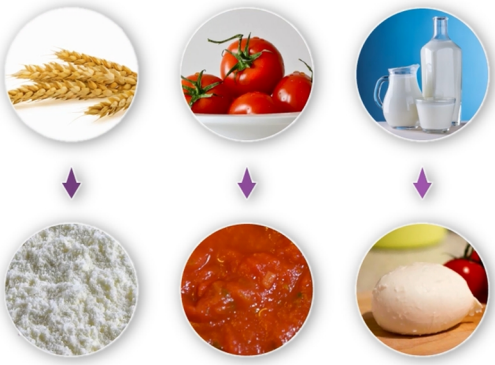
Take a Margherita pizza for example, one of consumers' favourite pizzas. If we want to make it from scratch, what ingredients do we need, and what are the raw materials behind them?

First off, we have to prepare the pizza dough. For that, we need flour, water and yeast. The raw material of flour is wheat.

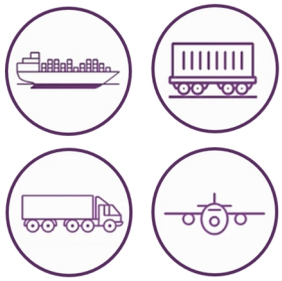
We are going to spread tomato puree on the dough. Here, the raw material is, of course, tomatoes.

Lastly, we need mozzarella cheese made from cow's milk.

To summarise, a Margherita pizza uses three main raw materials: wheat, tomatoes and milk. These raw materials had been transformed into flour, tomato puree and mozzarella. Each raw material followed its own route to become part of these ingredients, from the farm to the shops, via factories or manufacturing plants.



THE GEOGRAPHICAL ORIGINS OF THE RAW MATERIALS OF PIZZAS



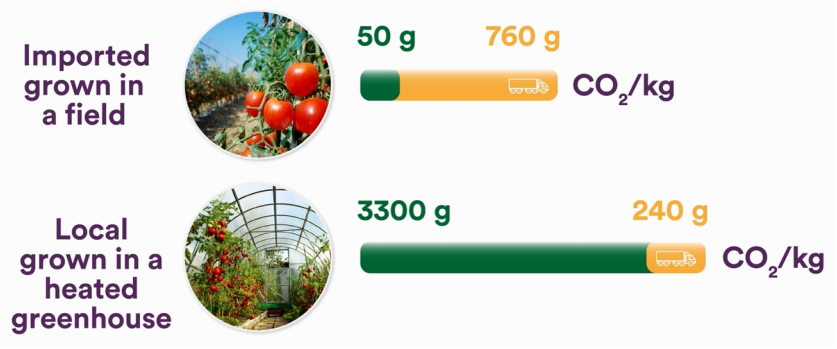
An end product may be consumed a considerable distance from the place of production of the raw materials used. A consumer country will sometimes import raw materials, either because it does not produce them in sufficient quantities, or because of production costs, if it is more advantageous to bring them from another country. Obviously, since importing raw materials implies transportation, this would have environmental consequences.

Let us go back to our example of a pizza in Switzerland.

Swiss wheat production is insufficient to cover the country's needs, so half of the wheat consumed is imported. The raw material of the flour used to prepare the pizza dough can therefore be wheat produced in Switzerland, but it is also possible that the wheat comes from another European country or even from North America. If it has travelled far, the transportation will affect the environmental impact.

Let us now look at the second ingredient, tomatoes. Again, tomato production in Switzerland is not enough to meet all needs, so Switzerland imports tomatoes, mainly from the European Union. This has an impact on the environment, especially if the tomatoes are transported fresh in refrigerated lorries.

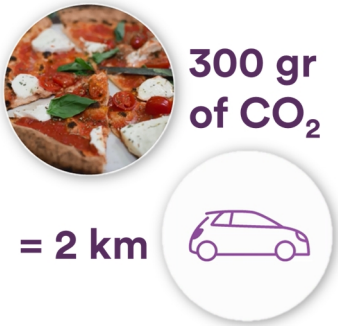
Growing tomatoes also requires a considerable amount of water: The production of 1 kg of tomatoes requires 50 L of water. Growing them in heated greenhouses, as is the case in the Netherlands, can considerably increase energy consumption and CO_2 emissions. So, tomatoes produced locally but under heated greenhouses have a much higher environmental impact than imported tomatoes produced at natural ambient temperatures.



Another key ingredient in a Margherita pizza, mozzarella, is a typical Italian product. This ingredient may well be imported from Italy or from other countries of the European Union, or it can have been produced in Switzerland. It may also have been imported from the US, the world's largest producer of mozzarella. The decision may be for several reasons, such as price. Just like tomatoes, mozzarella needs to be refrigerated during transportation.

On top of this, stockbreeding cattle to produce milk also has an environmental impact, owing to the high consumption of water and the emission of greenhouse gases.

This inventory of the ingredients and the raw materials used in manufacturing pizzas allows us to have an initial estimate of their impact on the environment. Just the ingredients alone for one pizza would be responsible, for example, for the emission of nearly 300 g of CO_2, which is as much as driving a car for more than 2 km.



5.3.2

The raw materials in a pizza

If the 5 billion pizzas eaten in the world each year were placed side by side, they would cover...

- O the whole of Lake Geneva, or 70 000 football pitches
- O the area of a city such as Paris, France
- O an area the size of the United States of America

Wheat is the raw material of...

- O the mozzarella used on a pizza
- O the flour used to make the pizza dough
- O the tomato puree on the pizza topping

Apart from water, the three main raw materials of a pizza Margherita are...

- O flour, tomato puree and mozzarella
- O wheat, tomatoes and milk
- O dough, tomatoes and mozzarella

Producing 1 kg of tomatoes requires...

- O 2 litres of water
- O 10 litres of water
- O 50 litres of water

Until a homemade pizza is cooked in an oven, it will not have caused any greenhouse gases.

- O True
- O False

The ingredients required to make just one pizza are considered responsible for the emission of the same amount of greenhouse gases as...

- O driving a car for 5 km
- O burning 1 kg of coal
- O growing a small apple tree

Answers

If the 5 billion pizzas eaten in the world each year were placed side by side, they would cover...

- ● **the whole of Lake Geneva, or 70 000 football pitches**
  Well done! That's also the equivalent of 192 football pitches a day!
- ○ **the area of a city such as Paris, France**
  Wrong! It's even more than that. This amount of pizzas could cover almost 4 times the area of a city like Paris.
- ○ **an area the size of the United States of America**
  Wrong! That would be too big.

Wheat is the raw material of...

- ○ **the mozzarella used on a pizza**
  Wrong! The raw material of mozzarella is milk.
- ● **the flour used to make the pizza dough**
  Well done! Pizza dough is traditionally made with wheat flour.
- ○ **the tomato puree on the pizza topping**
  Wrong! Try again.

Apart from water, the three main raw materials of a pizza Margherita are...

- ○ **flour, tomato puree and mozzarella**
  Wrong! These are not raw materials, as these are already the result of the transformation of other ingredients.
- ● **wheat, tomatoes and milk**
  Well done! That's right.
- ○ **dough, tomatoes and mozzarella**
  Wrong! For example, pizza dough is not a raw material, as it is already the product of the transformation of another ingredient.

Producing 1 kg of tomatoes requires...

- ○ **2 litres of water**
  Wrong! It's much more than that.
- ○ **10 litres of water**
  Wrong! Try again.
- ● **50 litres of water**
  Well done! That's roughly equivalent to 6 buckets of water.

Until a homemade pizza is cooked in an oven, it will not have caused any greenhouse gases.

- ○ **True**
  Wrong! The cultivation and transportation of the raw materials, as well as the production of the flour and the mozzarella will have already generated CO2 emissions. The dairy cows that produce the milk for the mozzarella release methane.
- ● **False**
  Well done! Obtaining the ingredients and then transporting and processing them will have already released greenhouse gases, such as CO2 or methane, into the atmosphere.

The ingredients required to make just one pizza are considered responsible for the emission of the same amount of greenhouse gases as...

- ● **driving a car for 5 km**
  Well done! On average, the ingredients of just one pizza are responsible for generating the equivalent of 300 g of CO2.
- ○ **burning 1 kg of coal**
  Wrong! It's less than that.
- ○ **growing a small apple tree**
  Wrong! On the contrary, trees and other plants consume CO2.

ACTT05C03L02_A

End products and raw materials

[8-10 years old]

Join the end products listed below to their main raw material.

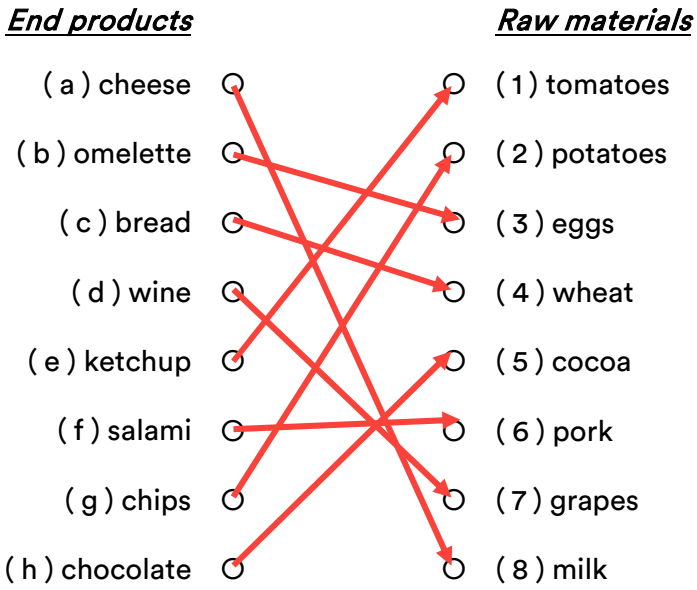
End products		***Raw materials***
(a) cheese	O	O (1) tomatoes
(b) omelette	O	O (2) potatoes
(c) bread	O	O (3) eggs
(d) wine	O	O (4) wheat
(e) ketchup	O	O (5) cocoa
(f) salami	O	O (6) pork
(g) chips	O	O (7) grapes
(h) chocolate	O	O (8) milk

Answers

End products and raw materials

[8-10 years old]

Join the end products listed below to their main raw material.



Answer

a. 8, b. 3, c 4, d. 7, e. 1, f. 6, g. 2, h. 5