



Slow Food®



**GOOD  
FOR THE PLANET,  
GOOD FOR OUR  
HEALTH**



**#FOODFORCHANGE**

Life cycle analysis of 6 Slow Food Presidia  
and other sustainable food products,  
compared with similar industrial products



**INDACO**  
INDicatori Ambientali e CO<sub>2</sub>

From "Analysis of the life cycle and carbon footprint of Slow Food Presidium products."  
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# SMALL-SCALE, VIRTUOUS FRIENDS OF THE CLIMATE

**It's not just heavy industry, transport and the production of energy from fossil fuels that produce greenhouse gases: Agriculture, including livestock farming (even when artisanal), also produces methane, carbon dioxide, and nitrous oxide.**

These gases join those produced naturally by marine and terrestrial ecosystems and create the so-called "greenhouse effect," in other words, the warming of the planet. This phenomenon, more than any other, threatens the future of our world.

**Of course, not all production processes have the same effect on global warming.** Identifying foods that have a lower impact can help us make alternative, well-informed choices.

This is why Slow Food, with the scientific support of INDACO2, has been carrying out analyses of Slow Food Presidia products since 2013. The idea is to use universally accepted and applied scientific parameters to measure the environmental value of products that we already know are sustainable from social and economic perspectives.

The emissions of a food production process can be measured thanks to the life cycle analysis (LCA) technique and their impact (the carbon footprint) can be expressed in grams, kilograms, or tonnes of carbon dioxide, or in carbon dioxide equivalent (CO<sub>2</sub> eq).

Although LCA is usually applied to industrial production systems and is still not a fully adequate method, given the complexity of diversified production, it remains the most widely used and accepted method in the scientific community. It was therefore worthwhile to apply it to a comparison between sustainable and large-scale, industrial production systems.

**The differences that the Indaco2 study highlights are significant—in some cases, remarkably so. To make the results easier to understand, CO<sub>2</sub>eq has been expressed in terms of the kilometers that a car would have to travel to emit the same quantity of CO<sub>2</sub>.**

It is worth remembering that extensive livestock farms, with large surface areas covered by vegetation (like most of the Presidia farms) have an advantage: The quantity of greenhouse gases emitted is often entirely compensated by the capacity of these systems to store carbon in the soil (what is known as "carbon uptake"). In other words, soils under vegetation, and those that are well drained and fertile, can absorb and store as much or more carbon than is released into the atmosphere during production processes. This kind of natural compensation can effectively cancel out the farm's impact on the planet, and, in some cases, even make it a carbon "creditor."

So, could a diet based on the consumption of products with a lower impact, make a difference if adopted by most of the population? And, are foods with a lower impact also healthier? **The answer to both questions is yes. At the end of this document you will find a section dedicated to evaluating the differences between a virtuous, climate-friendly diet, and a diet that is unsustainable, both for the planet and our health. The results are thought-provoking.**

**For more information visit [www.slowfood.com/slowmeat](http://www.slowfood.com/slowmeat)**



# HAY MILK



## PRODUCER



Martin  
Unterweger

## PRODUCTION AREA



Lesachtal  
Austria

## FARM SIZE



24  
hectares

## NUMBER OF ANIMALS



7 dairy  
cows

## ANNUAL OUTPUT



35  
tonnes

## FEED



Farm-produced  
grass and hay  
plus mixed grains

## Carbon Footprint

CO<sub>2</sub> emitted  
to produce  
1 liter of milk

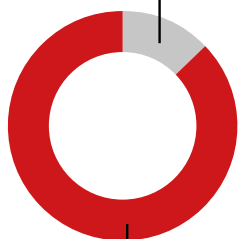
1.07Kg  
CO<sub>2</sub><sup>eq</sup>

-31%  
CO<sub>2</sub>

CO<sub>2</sub> generated by



13% farm activities



87% livestock  
management



COMPARED TO INDUSTRIAL MILK

1.54Kg  
CO<sub>2</sub><sup>eq</sup>



## Good Practices



Grazing on natural, perennial, unsown meadows



On-farm production of majority of feed, no silage



Purchased feed is certified organic (the hay milk STG production protocol allows for a minimum quantity of cereals)



Fertilizing with manure, which increases organic matter in the soil and maintains ecosystem biodiversity, as well as avoiding emissions from chemical fertilizers



All electricity from renewable sources (50% produced on-farm)



Distribution through a short supply chain

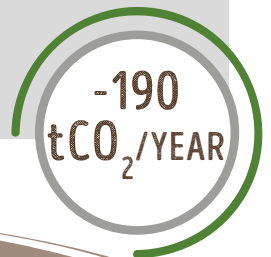


**Carbon absorption by plant ecosystems on the farm (equal to 239 tCO<sub>2</sub>/year) makes it possible to completely compensate for the emissions generated by milk production (equal to 48 tCO<sub>2</sub>/year). The farm could have another 27 animals and still balance its emissions.**

### > BY BUYING HAY MILK, YOU'RE HELPING THE PLANET!

The CO<sub>2</sub> savings made every year by Unterweger for milk production, compared to the emissions produced by an intensive and conventional farmer (to produce the same quantity of milk), correspond to the emissions of a car travelling for...

**...46,000 KM!**



# SLOW FOOD MACAGN PRESIDIO



## PRODUCER



Livio  
Garbaccio

## PRODUCTION AREA



Varallo (Vc)  
Piedmont - Italy

## FARM SIZE



**199**  
hectares  
of which 139  
are wooded

## NUMBER OF ANIMALS



**24**  
dairy cattle

## BREED



Bruna alpina  
and crosses

## FEED



Meadow  
grass and hay

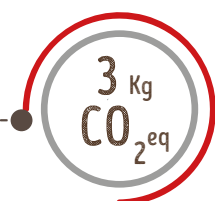


## ANNUAL OUTPUT

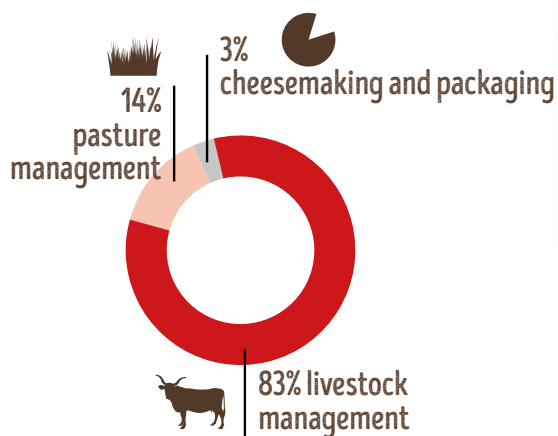
**3,780** wheels

## Carbon Footprint

CO<sub>2</sub> emitted  
to produce  
one 2-kg wheel  
of Macagn



CO<sub>2</sub> generated by



COMPARED TO AN INDUSTRIAL CHEESE



## Good Practices



Livestock diet based primarily on fresh mountain grass and hay, no silage



Leaves used instead of straw for bedding



Milking by hand twice a day (no electricity consumed)



Use of stream water



Artisanal cheesemaking process twice a day (no electricity consumed)



All electricity from renewable sources



**Carbon absorption by plant ecosystems on the farm (equal to 1,161 tCO<sub>2</sub>/year) makes it possible to completely compensate for the emissions generated by cheese production (equal to 126 tCO<sub>2</sub>/year).**

### > BY BUYING A MOUNTAIN PASTURE CHEESE, YOU'RE HELPING THE PLANET!

The CO<sub>2</sub> savings made every year by the Garbaccio farm for cheese production, compared to the emissions produced to make the same quantity of a similar industrial cheese, correspond to the emissions of a car travelling for...

**...154,100 Km!**



154,100  
Km

-1,035  
tCO<sub>2</sub>/year



# HEIRLOOM APPLE VARIETIES FROM DENMARK

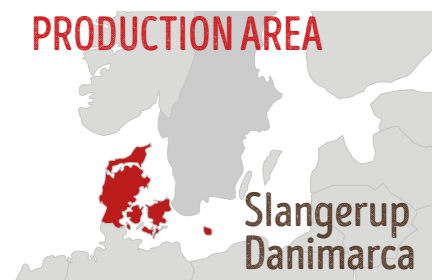


## PRODUCER



Verner  
Andersen

## PRODUCTION AREA



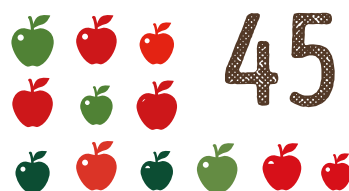
Slangerup  
Danimarca

## FARM SIZE



5.5  
Hectares

## VARIETIES CULTIVATED



## ANNUAL OUTPUT



76

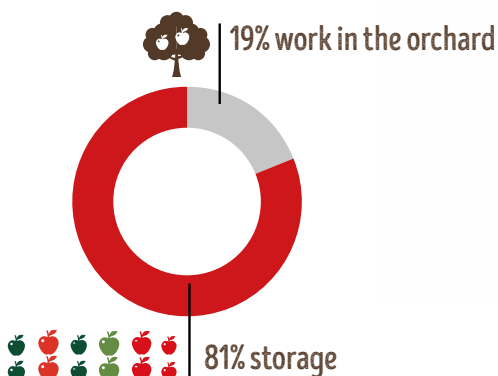
Tonnes of apples

## Carbon Footprint

CO<sub>2</sub> emitted  
to produce  
1 kg of apples

56g  
CO<sub>2</sub><sup>eq</sup>

CO<sub>2</sub> generated by



-81%  
CO<sub>2</sub>



COMPARED TO APPLES FROM INTENSIVE POMICULTURE

300g  
CO<sub>2</sub><sup>eq</sup>





## Good Practices



Manual harvesting



Biodynamic agriculture: only manure, sulfur and herbal treatments (*Equisetum arvense*)



Pollination by honey bees from hives at the edges of the orchard



Biodiversity preservation



Fertilizing with manure



Direct sales at the farm and local markets



Carbon absorption by plant ecosystems on the farm (equal to 3.3 tCO<sub>2</sub>/year) compensates for 80% of the emissions generated by the production of apples (equal to 4.2 tCO<sub>2</sub>/year).



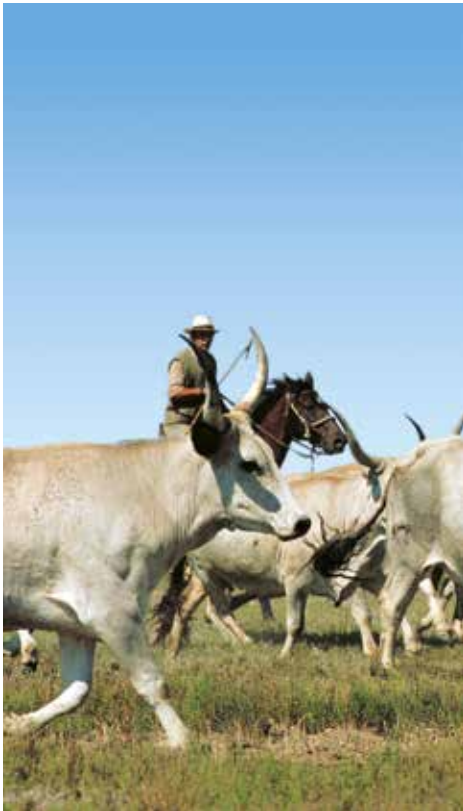
**BY BUYING APPLES FROM SUSTAINABLE AGRICULTURE, YOU'RE HELPING THE PLANET!**

The CO<sub>2</sub> savings made every year by Verner Andersen for apple growing, compared to the emissions produced on a farm that grows the same quantity of apples intensively and conventionally, correspond to the emissions of a car travelling for...

**...51,600 Km!**



# SLOW FOOD MAREMMANA CATTLE PRESIDIO



## PRODUCER



Manuela  
Menichetti

## PRODUCTION AREA



Manciano (GR)  
Tuscany - Italy

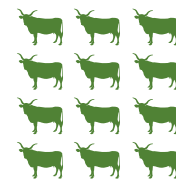
## FARM SIZE



141

Hectares, of which  
90 are wooded and  
51 are grassland

## NUMBER OF ANIMALS



63

## BREED



MAREMMANA  
Hardy local breed  
raised extensively

## FEED



Hay and crushed  
barley produced on  
the farm (organic)



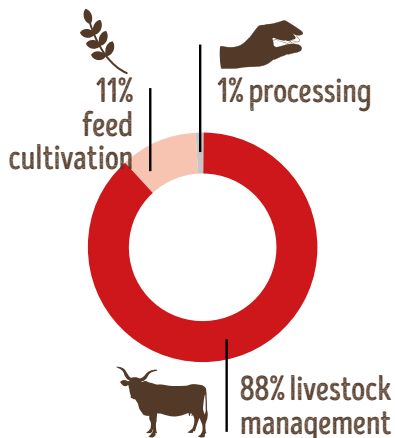
ANNUAL OUTPUT  
9 tonnes of beef

## Carbon Footprint

CO<sub>2</sub> emitted to produce  
one hamburger made  
with 200 g  
Maremmana beef

3.2 Kg  
CO<sub>2</sub>eq

CO<sub>2</sub> generated by



-30%  
CO<sub>2</sub>

COMPARED TO AN INDUSTRIAL HAMBURGER

4.6 Kg  
CO<sub>2</sub>eq



## Good Practices



Animals' diet based on farm-produced barley, hay, and fresh grass; no silage



No use of chemical products for cereal cultivation



Use of manure from the barns as fertilizer



Use of lake water



Biodiversity conservation (local breed with high yields: 65% vs 60% for a conventional breed)



Short supply chain entirely managed by the farm



**Carbon absorption by plant ecosystems on the farm (equal to 748 tCO<sub>2</sub>/year) entirely compensates for the emissions generated by the production of Maremmana beef (equal to 180 tCO<sub>2</sub>/year), with a surplus absorption of 568 tCO<sub>2</sub>.**

**-568**  
tCO<sub>2</sub>/YEAR



**BY BUYING MEAT FROM EXTENSIVELY RAISED CATTLE,  
YOU'RE HELPING THE PLANET!**

The CO<sub>2</sub> savings made every year by the Menichetti farm, compared to the emissions produced on a farm that rears beef cattle intensively and conventionally (to produce the same quantity of meat), correspond to the emissions of a car travelling for...

**...36,200 Km!**



**36,200**  
**Km**



# CASCINA SANTA BRERA EGGS



## PRODUCER



Cascina  
Santa Brera

## PRODUCTION AREA



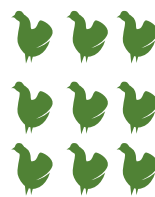
San Giuliano  
Milanese (MI)  
Lombardy -  
Italy

## FARM SIZE



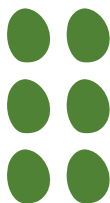
1  
hectare

## NUMBER OF ANIMALS



1,000

## ANNUAL OUTPUT



151,000  
eggs

## FEED



Farm-produced  
grain and mix  
of organic  
cereals and  
bread soaked in  
water

## Carbon Footprint

CO<sub>2</sub> emitted  
to produce  
4 eggs

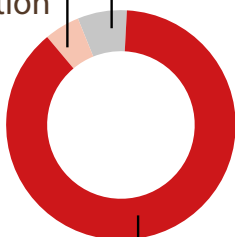
530g  
CO<sub>2</sub><sup>eq</sup>

CO<sub>2</sub> generated by

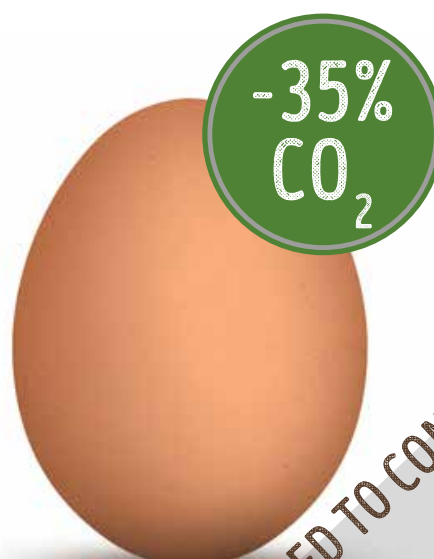
5%  
packaging/  
distribution



7% livestock  
management



88% purchased  
organic feed



-35%  
CO<sub>2</sub>

COMPARED TO CONVENTIONAL EGGS

820g  
CO<sub>2</sub><sup>eq</sup>



## Good Practices



Chickens kept outdoors, with shelter in mobile coops



Some feed is produced on-farm, purchased feed is certified organic



No use of soy



Straw in coops changed every day (to sequester nitrogen from manure)



Farm-produced wood chips used for heating water given to the animals in winter



Direct sale of eggs, unpackaged or in recycled cardboard boxes



**Carbon absorption by plant ecosystems on the farm (equal to 63 tCO<sub>2</sub>/year) allows for complete compensation for the emissions generated by the production of eggs (equal to 20 tCO<sub>2</sub>/year), with a surplus absorption of 43 tCO<sub>2</sub>.**



**BY BUYING ORGANIC, FREE-RANGE EGGS,  
YOU'RE HELPING THE PLANET!**

The CO<sub>2</sub> savings made every year by Cascina Santa Brera, compared to the emissions produced on a farm that produces the same quantity of eggs intensively and conventionally, correspond to the emissions of a car travelling for...

**...30,200 Km!**



# SLOW FOOD BELICE VALLEY VASTEDDA PRESIDIO



## PRODUCER



Liborio  
Cucchiara

## PRODUCTION AREA



Salemi (TP)  
Sicily - Italy

## FARM SIZE



52 hectares  
of which 2 are  
wooded, 20 are  
cultivated, and  
4 are for hay

## NUMBER OF ANIMALS



954  
(800 sheep,  
20 rams,  
134 lambs)

## ANNUAL OUTPUT



7,800  
Cheeses

## FEED



Grass and hay,  
barley, oats,  
fava beans,  
and wheat

## BREED



Valle del Belice Sheep  
hardy, local, high-yielding breed

## Carbon Footprint

CO<sub>2</sub> emitted  
to produce one  
500-g Vastedda  
cheese

2.13Kg  
CO<sub>2</sub><sup>eq</sup>

CO<sub>2</sub> generated by



-60%  
CO<sub>2</sub>

COMPARED TO AN INDUSTRIAL CHEESE

5.32Kg  
CO<sub>2</sub><sup>eq</sup>





## Good Practices



Diet supplemented by farm-produced grains and legumes



No chemical products



Use of manure from the barns as fertilizer



Milking by hand twice a day (no electricity consumed)



Artisanal cheesemaking process



"Renewable" farm, with 70% reduction in energy consumption thanks to the use of solar



panels



**Carbon absorption by plant ecosystems on the farm (equal to 158 tCO<sub>2</sub>/year) compensates for 80% of the emissions generated by cheese production (equal to 176 tCO<sub>2</sub>/year).**



### BY BUYING A CHEESE LIKE BELICE VALLEY VASTEDDA, YOU'RE HELPING THE PLANET!

The CO<sub>2</sub> savings made every year by the Cucchiara farm to produce Vastedda, compared to the emissions produced on a farm that produces the same quantity of a similar sheep's milk cheese with intensive, conventional methods correspond to the emissions of a car travelling for...

**...83,800 KM**



## Methodology, Standards, and Legislative References

This report summarizes the results of the Life Cycle Assessment (LCA) of products from a selection of Slow Food Presidia. The assessment was conducted in accordance with the ISO/TS 14040-14044:2006 standards in "Environmental Management: Life Cycle Assessment."

The aforementioned technical specifications identify the general principles, requirements, and guidelines to be observed for the measurement and reporting of the results of the LCA of a product, namely the potential environmental impacts generated in the various stages of the life cycle, with reference to specific impact categories.

The process involved thorough inventory analysis of all processes in the life cycle of a product, i.e. the whole production chain, from managing cultivated fields to harvesting, storage, processing, and packaging of the finished product. In the case of livestock rearing, the analysis considered processes for livestock management, feeding the animals, facilities, and product processing.

The impact category taken into consideration is the Carbon Footprint (CFP) / Global Warming Potential (GWP100), or estimated greenhouse gas emissions - i.e. CO<sub>2</sub> (carbon dioxide), CH<sub>4</sub> (methane), and N<sub>2</sub>O (nitrous oxide) expressed in kg CO<sub>2</sub> eq (carbon dioxide equivalent).

The study was carried out using the Ecoinvent 3 database. The model was developed using the SimaPro 8.0.3 LCA software, selecting the single issue GHG protocol method, updated to IPCC 2013 characterization factors. As current databases (e.g. Ecoinvent) do not take account of direct emissions linked to the use of fossil fuels and to the application of pesticides/fertilizers in the field, ad hoc models were developed for the selected case study (2006 IPCC guidelines for fuels, EMEP/EEA et al.; 2009 for direct fertilizer emissions into the atmosphere; and Audsley et al., 2003 and Berthoud et al., 2011 for emissions into soil and surface water). The data obtained were compared with similar conventional production (i.e. average European production) using data from the international literature.

# A HEALTHY DIET IS ALSO GOOD FOR THE CLIMATE

Our everyday food choices have an impact on our health, but also on the climate. Choosing more vegetables and legumes and less meat and industrial foods can lead to a considerable reduction in CO<sub>2</sub> emissions.

This is clear from a study carried out with INDACO2 (INDicatori Ambientali e CO<sub>2</sub>), a spin-off of the University of Siena inspired by the work of scholar and environmentalist Enzo Tiezzi, with advice from Dr. Andrea Pezzana, a physician and nutritionist (SC Nutrizione Clinica – ASL Città di Torino) whom Slow Food has consulted on healthy food projects for many years.

An unhealthy weekly diet, based on highly processed foods and animal protein from factory farms and with a high environmental impact, was compared with a healthy, “climate-friendly” diet, based primarily on plants and unrefined, fresh foods, produced using sustainable or organic practices and, in some cases, belonging to Slow Food Presidia.

The plan was to see if paying greater attention to the healthiness and environmental sustainability of the foods we consume could also mean a reduction of greenhouse gases.

Calculations were based on the food requirements of a healthy adult between the ages of 30 and 40, who needs to consume about 2,000 Cal daily.



**A healthy diet is  
a climate-friendly diet**  
Consuming these products  
corresponds to weekly greenhouse  
gas emissions equal to

**14 kg CO<sub>2</sub> eq**

One interesting point concerns the amount of meat included in this diet.

The average annual per capita consumption in the West is around 80 kilos of meat. This is already excessive for the planet, but by 2050, when the Earth will be home to around 9 billion inhabitants, it will be literally unsustainable.

An adult does not need more than 500 grams of meat a week. Reducing meat consumption and increasing consumption of legumes and other vegetables is a good habit for our own health and for the planet's health.

In contrast to this example, a weekly diet based on industrially produced food, including factory-farmed meat in excessive quantities (1.55 kg, the amount consumed by the average European, and triple the amount recommended by nutritionists) produces considerably more greenhouse gases.


This is not the only problem, of course. An excess of meat and cured meats—typical of diets high in protein and fat—as well as pre-cooked industrial foods with a high fat content, sugary drinks, ice creams, frozen pizzas, prepared snacks, candies, and refined foods (white bread and pasta made from refined flours) also brings serious health risks.

The foods that compose a weekly diet that is unsustainable for both health and the environment (foods which, unfortunately, the majority of people regularly buy, even if they do not consume them in excessive quantities) leads to an accumulation of harmful



Consuming these products corresponds to weekly greenhouse gas emissions equal to

Choosing to be sustainable and healthy means saving **33 kg CO<sub>2</sub>e** every week



The calculation of the healthy diet's carbon footprint, produced by INDACO2, considered the emissions generated during the production processes of a series of foods:

- The figure for meat was obtained by taking an average of the carbon footprints of three Slow Food Presidia: beef from Maremmana cattle from the Menichetti farm, pork from Mora Romagnola pigs from the Zavoli farm, and Alsatian black chicken from Gilbert Schmitt's farm in France. **Of course, there is no need to buy meat from these particular farms in order to reduce emissions: Local farms can also be found that are primarily or completely extensive and that feed their animals only grass, hay, and quality legumes and grains.**
- The figure for fruit came from an analysis carried out on the heirloom apple varieties grown on Verner Andersen's biodynamic farm in Denmark. **Once again, what is important is buying fruit from environmentally aware growers who limit or avoid the use of chemical products, in order to reduce emissions.**
- The eggs were assumed to have come from the outdoor-reared chickens at the organic Cascina Santa Brera farm in San Giuliano Milanese, but **choosing any organic eggs from chickens raised outdoors guarantees a similar level of impact in terms of emissions.**
- The extra virgin olive oil figure was based on the Maestrat Millenary Tree Extra Virgin Olive Oil Presidium, but there are many olive oil producers who follow sustainable principles: **It is enough to look for organic extra virgin olive oil that is PDO certified or produced from local varieties in order to ensure the same level of impact.**
- The figure for cheese was an average from three Presidia: the Cucchiera farm's Belice Valley Vastedda, the Garbaccio farm's Macagn, and the Pecorelli farm's Basilicata Caciocavallo Podolico. These are all raw-milk cheeses produced by farms that raise their own animals, keeping them outdoors for much of the year and feeding them grass and hay supplemented by quality grains. **There are many other similar small-scale farms to be found.**
- The other products considered in the calculation were assumed to have come from organic agriculture and short supply chains.

It is also worth noting that the calculation of the emissions was primarily based on foods that are eaten in significant quantities. Herbs, spices, and seeds were not taken into account in the calculation of the carbon footprint because their influence on greenhouse gas emissions is negligible. From a health point of view, however, they can make food healthier and tastier and contribute to replacing salt, which, in high doses (over 5 grams a day), is harmful to health.

# HEALTHY AND CLIMATE-FRIENDLY DIET

PORTIONS			
BREAKFAST			
yogurt	125g		
wholemeal bread	50g		
fruit	150g		
LUNCH AND DINNER			
vegetables	200g		
meat (beef, pork, chicken)	125g		
egg	50g		
fresh cheese	125g		
aged cheese	50g		
fresh legumes	150g		
fish	150g		
wholemeal bread	50g		
pasta or other grains	80g		
fruit	150g		
oil	20g		
SNACK			
dried fruit and nuts	15g		
bread/crackers/grissini	30g		
DESSERT			
jam	25g		
BREAKFAST	LUNCH	SNACK	DINNER





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