Co-funded by the European Union

SSPICEIT!
Sustainability Skills Program for International Catering operators and Entrepreneurs through Integrated Training

SSPICE IT! – Sustainability Skills Program for International Catering operators and Entrepreneurs through Integrated Training

SSPICE IT! project is co-funded by the European Commission within the Erasmus+ programme.

Città metropolitana di Roma Capitale · POUR LA SOLIDARITÉ European think & do tank · CIPFP CAMINO DE SANTIAGO ESCUELA DE HOSTELERÍA & TURISMO DE LA RIOJA · Escola Profissional AMAR TERRA VERDE · AKMI · WORK'S · iED · CAPITALE LAVORO

Submodule n°12: How to Measure the Climate Impact of Your Food

THEMATIC AREA	How to create a sustainable supply chain
SUB AREA OF REFERENCE	*Sustainable Food*
HOURS	5

LEARNING OBJECTIVES

1. **Understand the impact of food on environment and know which ingredients have the highest environmental, but also economic and social impact**

2. **Be able to develop a sustainable menu, taking into account all the aspects of sustainability**

LEARNING ACTIVITIES

Theoretical	Practical
✓ Main impacts of the food system on the environment ✓ Selection of more sustainable production systems and foods ✓ Construction of networks of local producers	✓ How to evaluate the sustainability of a production system ✓ How to reduce one's water consumption ✓ How to evaluate the impact of food on the environment and choose sustainable suppliers ✓ How to create a network of local producers

Co-funded by the European Union

CONTENT

Co-funded by the European Union

SUBMODULE 12: How to Measure the Climate Impact of Your Food

In the last ten years we have witnessed a rapid transformation of the consumers, both in terms of what they want and what they need. The Consumers of the new millennium are, without doubt, more informed, and want to be part of the world in which they live. This means that they have understood how important their choices and daily life are for their life, their health, and for the world in which they live and work.

Furthermore, we are witnessing an interesting phenomenon in most industrialised countries: the spread of a culture of food awareness. An increasing percentage of the population wants to be informed about what they eat, how it was produced and what its nutritional characteristics are. Being aware of how to eat properly is good for oneself, society and the planet, and to do this, consumers have the right to receive clear and safe information about the product they are buying and, consequently, companies have a duty to provide it.

The desire that drives these people is to stop being passive consumers and instead become active protagonists of their choices. This way of approaching food is reflected in the growing number of people who for different reasons are choosing to change their relationship with food: vegetarians, vegans, zero kilometre supporters... The reasons that drive these groups to embark on new food paths can be diverse: animal rights sensitivities, ethical reasons or environmental sustainability. Between the various currents there are profound differences in their approach to environmental issues.

Zero kilometre supporters advocate a diet based on seasonal and local products, not imported from other countries or continents. However, taking into consideration only one aspect of the question is not enough to ensure food sustainability. For example, a local and seasonal product could have a big impact on environment if produced in intensive farming.

Understanding the impact of the food you buy and sell is therefore extremely important: to be able to develop a sustainable menu but also to be able to explain to clients the choices behind the menu that you present.

This chapter will give some tools to understand and evaluate the impact of your food, so that you can make informed choices.

Co-funded by
the European Union

1. How can we evaluate the impact of our food?

Producing food means using water, air, land, labour and fuels that emit carbon dioxide and other gases into the atmosphere. So how can we eat in a way that protects our health and our planet, and which foods are most sustainable for the environment? One suggestion comes to us from the double food pyramid.

Figure n.3. Double Food Pyramid (The BCFN Foundation Barilla Center Food&Nutrition 2016)

It includes different aspects:

- **to eat fruits and vegetables that are in season, preferring local products, definitely fresh,** that do not have to have travelled hundreds of miles to end up on our plates, **sold by the farmer, who grows them on his piece of land in our areas** (fish, for example, should be caught in the right growing season and in the seas closest to the place of consumption, with fishing methods that preserve the health of the sea);
- **to eat foods that are derived from plants and animals** that are not in danger of extinction, protecting biodiversity on land and in the sea;
- to **avoid foods that are too industrially manipulated**, as they are harmful to health and the environment;
- to **reduce meat consumption**.

Co-funded by the European Union

The Mediterranean Diet represents, for example, a sustainable food model for the environment but also for health

Figure n.4. New food pyramid proposed at the first world conference on the Mediterranean Diet as a healthy and sustainable model.

So how can we make the best choice while reducing our environmental impact at the dinner table?

With regard to **CO2 production**, an initial distinction must be made. There are certain foods whose carbon dioxide production is closely linked to the production process, while others are among the worst because of the distance they have to travel for them to reach our tables.

Looking at the latter, the foods with the most environmental impact with respect to the transportation process are:

Co-funded by the European Union

- Cherries from Chile: 21.55 kg of CO2, derived from a distance of about 11,968 km;
- Blueberries from Argentina: 20.13 kg of CO2, distance 11,178 km;
- Asparagus from Peru: 19.54 kg of CO2, distance 10,852 km;
- Walnuts from California: 18.90 kg CO2, distance 10,497 km;

This is a reason to choose 0-km products or products from the local area where the CO2 production that comes from transportation is reduced compared to foods that come from further away.

Instead if we look at the foods that have a high CO2 consumption related to production at the top we find beef. In this sense it weighs heavily on livestock farming and more so on intensive farming. This is followed by lamb cheese and dairy products. Below are 10 foods reported as worst in terms of environmental sustainability:

- Beef;
- Lamb meat and mutton;
- Cheese;
- Cows (dairy products);
- Dark chocolate;
- Coffee;
- Pork;
- Poultry;
- Fish (farmed);
- Eggs.

As for the foods with the greatest impact for **water resources** instead of beef, which still has a very high water impact, in the very first positions we find chocolate. In fact, it takes 20.000 litres of water per 1 kg of product, while we find coffee in seventh position with 18.900 litres per 1 kg of product. Beef is in third place. To make a comparison with fruit for 1 kg of apples there stands a consumption of 800 litres of water.

Co-funded by
the European Union

Finally, we need to consider the **consumption of soil,** and in this sense we need to think about production techniques.

Organic cultivation respects nature, as well as enhances the surrounding **biodiversity** and greatly reduces the environmental impact of food throughout the process. Intensive cultivation and farming, which require large spaces, are less natural.

The land consumption is also linked to the production of animal feed. In fact, a single dairy cow can consume more than 40 kg of hay per day, while beef cattle are around 10 kg per day.

Organic and non-intensive crops should be preferred, and even in the case of meat; one can also choose meat from organic or pasture-based farms, as they consider animal welfare. In any case, the consumption of meat and cow's milk, which are among the foods with the largest environmental footprint, should be reduced.

2. Seasonality – typicality – local productions

As we have just seen, products that are in season, locally produced and fresh are more sustainable and should be preferred.

It is fundamental, in order **to understand the dynamics and distribution of typical products in a geographical region**, to analyse the *natural environment* in which production takes place. In fact, typical products are a direct consequence of the production and processing of agricultural products (grapes, olives, eggs, domestic animal husbandry, etc.), the production and quality of which is closely linked to the environmental characteristics in which the farms and crops are located. For example, the type of soil can influence the crop that can be planted there: soils can be acid or basic, clay or sandy, rich or poor in nutrients. Another important factor is the slope: if a land is in a valley or on a hill or a mountain, it will have different slopes and therefore the choice of cultivation will have to be adapted.

Another environmental aspect that influence the cultivability of one species over another is undoubtedly the *climate*, i.e. the physical parameters of rainfall, temperature, exposure, etc.

The climate is indeed decisive in determining whether it is possible to grow a particular domestic species. For example, the Mediterranean climate is decisive for the cultivation of vines and olive trees. In fact, we can grow these plants only in areas with a warm Mediterranean climate, which can be the Mediterranean basin, where these species originate, but also other areas of the planet (think of California in the USA, where oil and wine are produced as here) where the climatic conditions are similar. And we can

Co-funded by the European Union

respect seasonality, which is synonymous with good, natural cultivation that preserves the wellbeing of the land.

By typical product we mean a characteristic product, with a strong link with the geographical area in which it was born and with very specific qualitative characteristics, also due to the artisanal manufacturing processes handed down for generations. Consumers have been oriented towards this type of product for some time, increasingly searching, in a market which tends towards the standardization of tastes, for an offer based on the authenticity of the table, on the exclusivity of typical products, on what significant and unique a location can offer to increase the quality of travel experiences.

In Italy, for example, the artistic heritage is also associated with the food and wine heritage. Therefore, typical products, as holders of specific and unrepeatable values of the territory, are an economic, but also cultural wealth, capable of contributing both to the development and to the discovery of many places, not yet sufficiently known. The process of diversification of typical products is closely linked to the environmental and historical events of human populations on the planet.

Finally, it is essential to respect the seasonality of food, not only for plant-based products, but also fish products. **Seasonality identifies, in the case of food, the best time to consume a food item.** For guidance in choosing seasonal fruits and vegetables you can consult the annual seasonality calendar.

Here are the benefits of respecting the seasonality of food:

- ✓ Seasonality is good for our health and allows us to get all those nutrients we need;
- ✓ Growing produce out of season involves backing up to greenhouses and a consequent use of more energy in terms of heating, but also use of pesticides and fertilizers;
- ✓ Off-season produce has a higher price, so using seasonal produce saves us money in terms of costs;

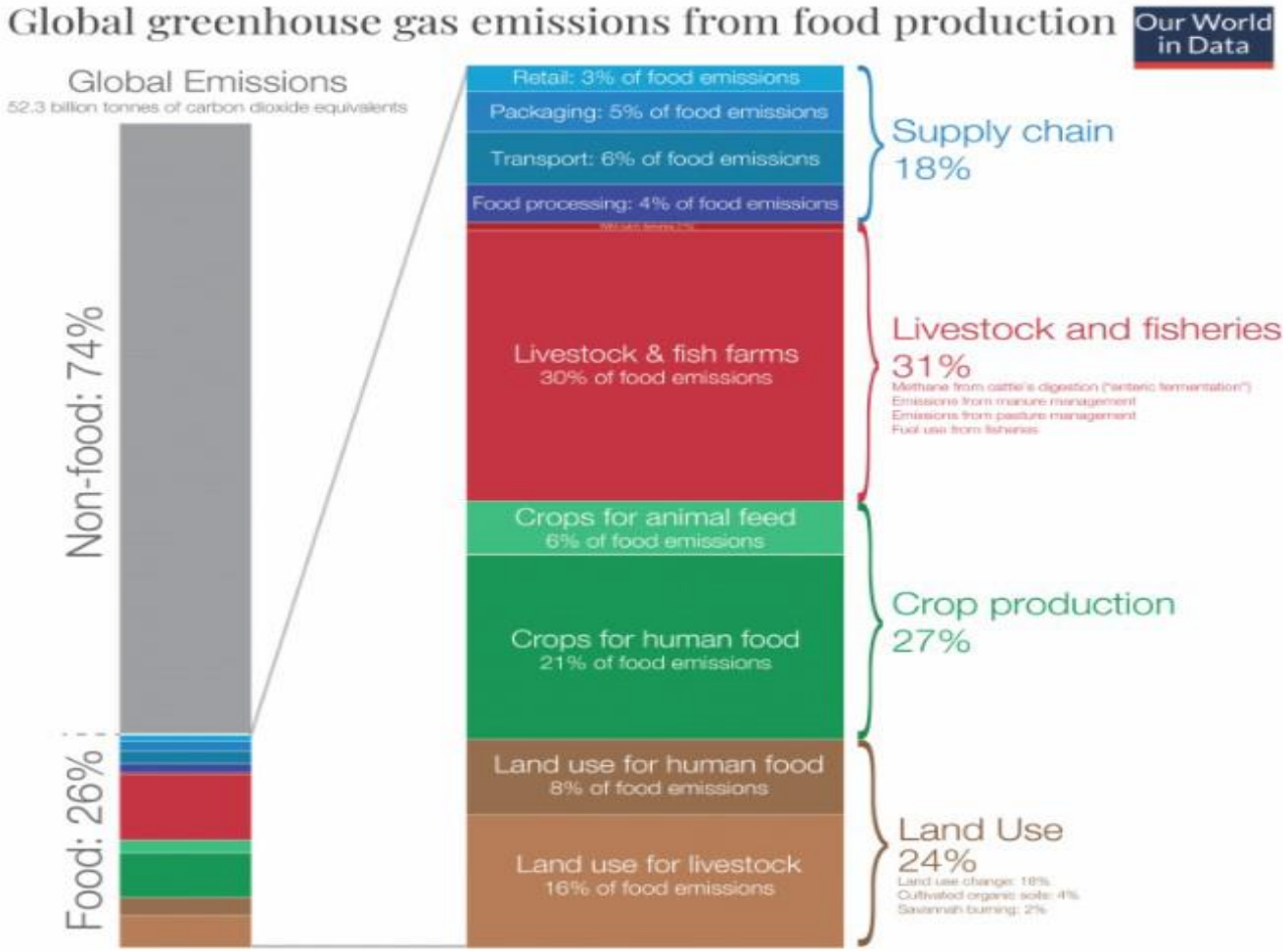
Seasonality preserves the taste of food as seasonal produce has a higher nutritional intake which also affects taste.

Co-funded by
the European Union

3. Protein transition: the environmental impact of the mass consumption of farmed meats and valorisation of agricultural productions with a high protein content

Today, the largest source of protein in our diet comes from animal products but the livestock industry is among the ones with the biggest impacts on the environment. In particular, the meat industry is estimated to emit 7.1 giga tonnes of CO2eq (equivalent) per year.

According to the study performed by Hannah Ritchie and Max Roser (2020) in 2018, food system emissions accounted for 26% of total greenhouse gas emissions, with 31% of emissions coming from livestock and fisheries (Figure n.5). The emissions came for the main part from agricultural and land use/land-use change activities (71%), while the remainder came from supply chain activities: retail, transport, consumption, fuel production, waste management, industrial processes and packaging. (Hannah Ritchie and Max Roser, 2020).



1*Figure n.5: Global GHG emissions from food production (Ritchie and Roser, 2020)*

Co-funded by the European Union

The methods of agriculture and animal husbandry have become intensive (aimed at obtaining maximum productivity from arable land and livestock).

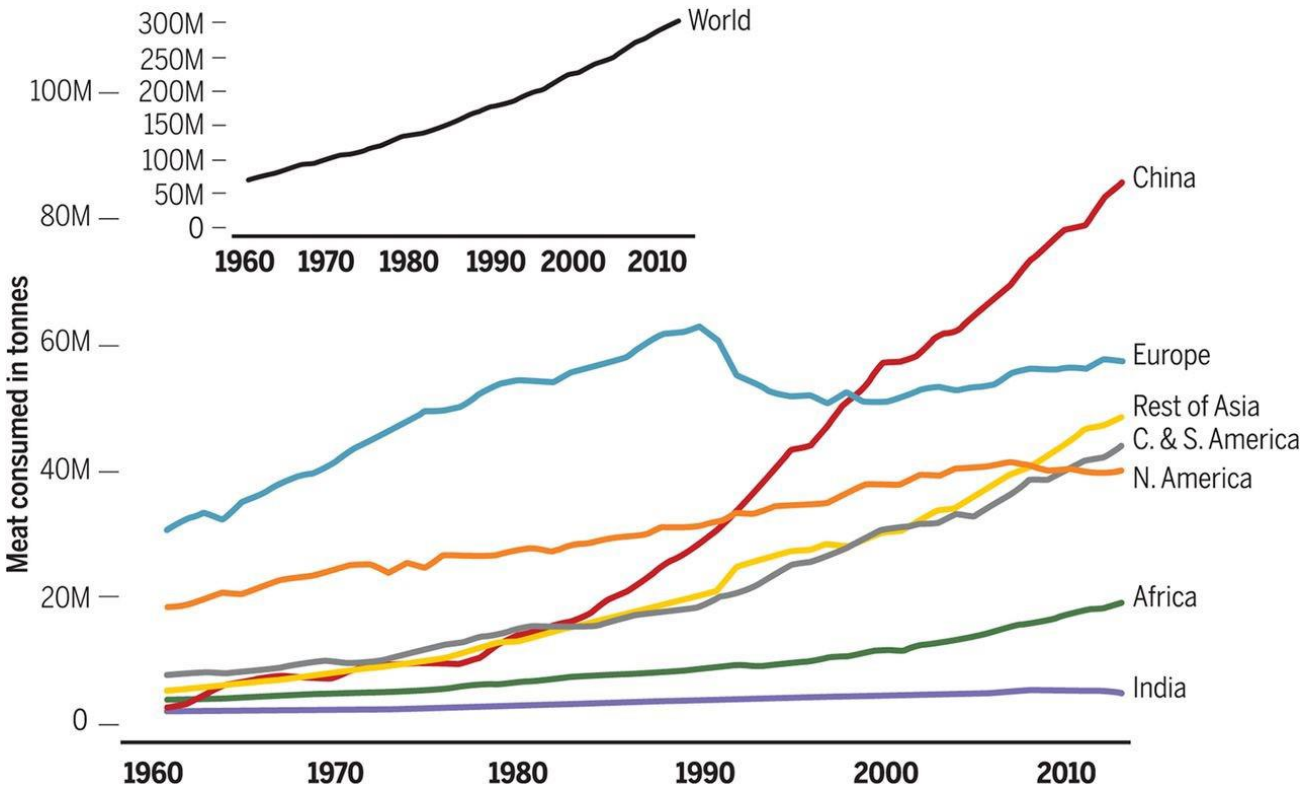
The processes that contribute to the main greenhouse gas emissions during meat production are:

- feed production,
- enteric fermentation from animal digestion by animals (mainly ruminants)
- treatment of livestock effluents
- energy use in stables. (Gerber, P.J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falcucci, A. & Tempio, G. 2013

In addition to greenhouse gas emissions, livestock production is responsible for many other issues, such as lack of biodiversity, land consumption, deforestation, eutrophication and acidification. The impact on deforestation can be either direct, that is, with the need to create space for livestock using forests, or indirect, through agriculture.

Moreover, as the population continues to grow and is estimated to reach almost 10 billion by 2050, the problem of food resources is becoming more and more real: the demand for protein and thus the intensification of livestock farming will lead to an increase in problems and maintaining this style of feeding could lead to a greater environmental impact (Figure n.6).

Co-funded by
the European Union



2Figure n.6: Total meat consumption (in million tonnes) in different regions and globally (Godfrayet al., Science 361, 2018)

All these analysed factors lead us to think about a **necessary change in our eating style, limiting our consumption of meat, in particular the ones with the major impact on the environment and valorising agricultural productions with a high protein content**.

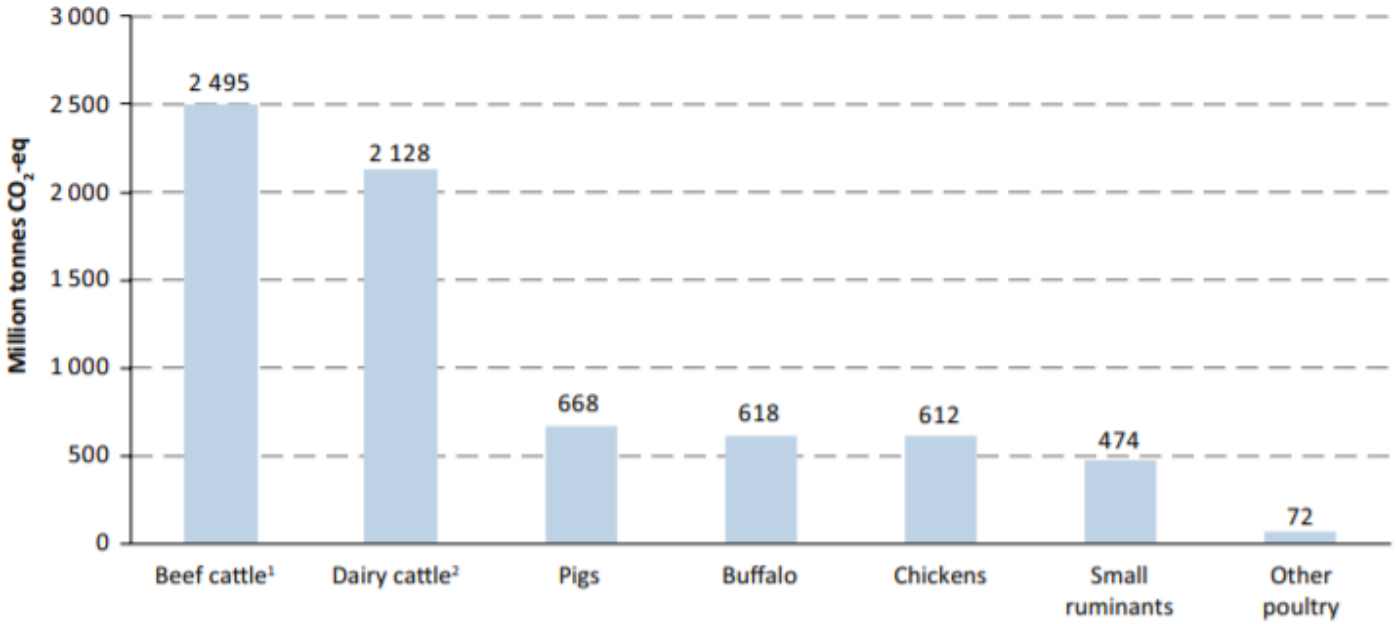
Infact, not all types of meat are the same. Figure n.7 shows the estimated global emissions per species of animals, while Figure n.8 illustrates their impact on land use.

We can clearly see that beef is the most impactful of the types of meat, with significant CO2 emissions from the breeding stage and a very high land need.

For pigs and chickens, greenhouse gas emissions come mainly from feed production and manure treatment.

Co-funded by
the European Union

The species that require the greater land use for products are lamb and beef, both for the production of meat and dairy products such as cheese and milk.



*Includes emissions attributed to edible products and to other goods and services, such as draught power and wool.
¹ Producing meat and non-edible outputs.
² Producing milk and meat as well as non-edible outputs.

Source: GLEAM.

Figure n. 7. Estimated global emissions per species (Gerber, P.J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falcucci, A. & Tempio, G. 2013.).

Co-funded by the European Union

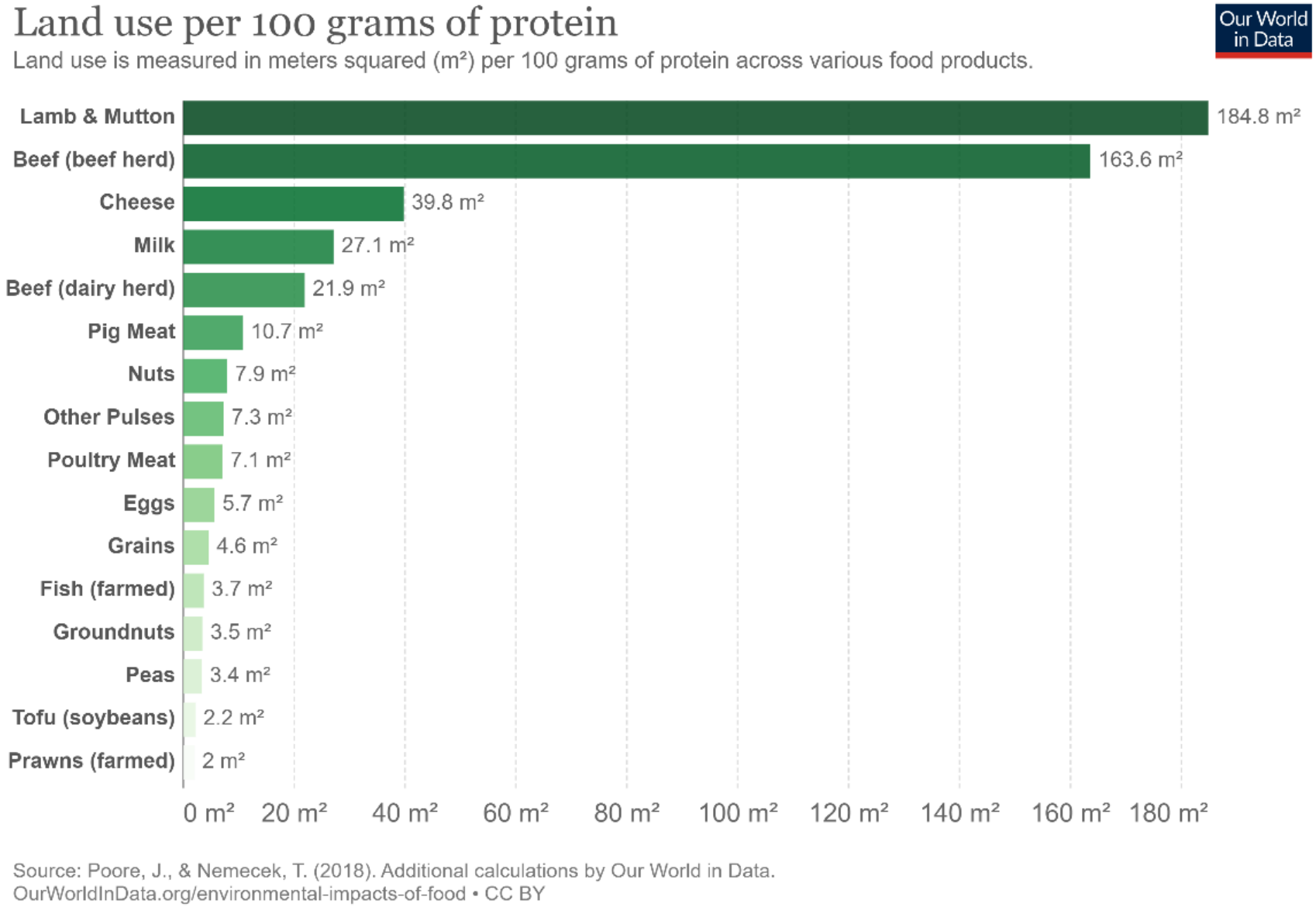
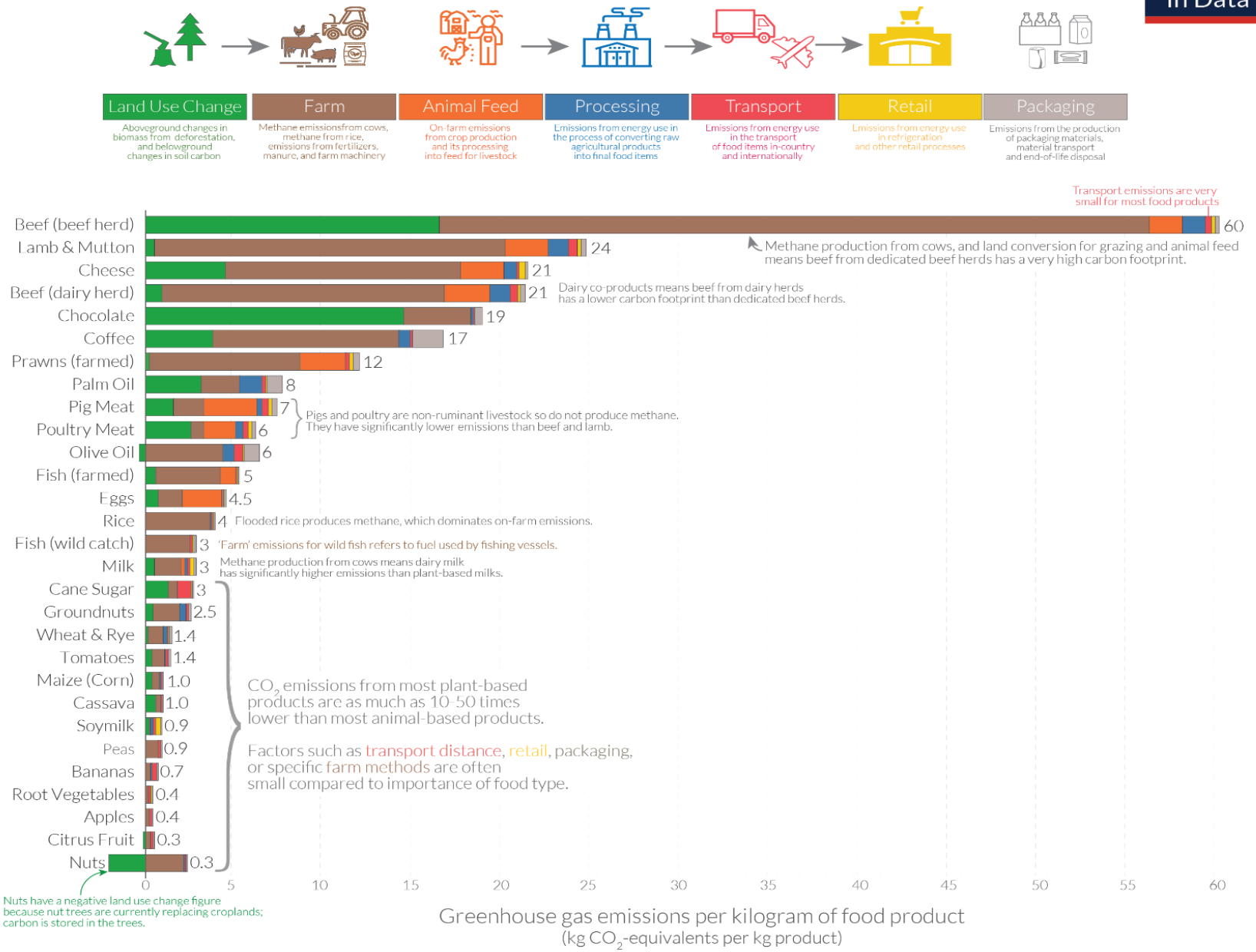


Tableau 1Figure n. 8: Land use per 100 grams of protein (Ritchie and Roser, 2020)

Co-funded by the European Union

Food: greenhouse gas emissions across the supply chain

Our World in Data



Note: Greenhouse gas emissions are given as global average values based on data across 38,700 commercially viable farms in 119 countries.
Data source: Poore and Nemecek (2018). Reducing food's environmental impacts through producers and consumers. *Science*. Images sourced from the Noun Project.
OurWorldinData.org – Research and data to make progress against the world's largest problems.

SSPICE!T!

Tableau 2Figure n. 9. GHG emissions considering the entire lifecycle of a product (Ritchie and Roser, 2020)

How can you ensure that your menu is sustainable?

As we have seen, a sustainable meal is an affordable meal that uses foods that have a low impact in terms of land use, water resources used and low CO2 emissions in the air, is mindful of the conservation of biodiversity and ecosystems and have been produced sustainably from a socio-economic point of view.

Here are some **tips that you should always follow to ensure a sustainable menu at your table**.

✓ Adapt your menu to a short supply chain logic, because a menu must be linked to the territory and in symbiosis with it;
✓ Distinguish flavours and foods by building a clean sensory profile not contaminated by synthetic foods offered by the market;
✓ Choose suppliers who use techniques that preserve soil fertility and biodiversity;
✓ As a practitioner, educate yourself on the impact of food on health and the environment as well as gastronomic aspects, and develop menus that combine taste and sustainability
✓ Manage waste by putting it back into circulation, transforming it into a resource for other realities

Exercise: *Which food has the least environmental impact and which should be consumed most consciously*	
Pre-requisites	/
Time	1 hour
Tools	SSPICE IT! Manual, PC or smartphones, internet connection, printer
Objectives	1. Carry out a survey on Foods with Greater Environmental Impact and Conscious Consumption among school students
Instructions	
This exercise should be realised, when possible, in group. 1. Step 1: Gather information on sustainable food consumption, using the material provided in the Manual, including the additional references, and make a list of foods with less environmental impact. 2. Step 2: With the support of the teacher, realise a questionnaire to investigate conscious food consumption among your peers: the objective of the	

Co-funded by the European Union

questionnaire is to understand what kind of food they usually consume (food with high or low impact on the environment) and if they are conscious of the impact of their habits.

3. Step 3: Carry out a survey, using the questionnaire, among your peers, trying to reach as many students of your school as possible.

4. Step 4: Analyse the results of the survey and elaborate a report, calculating the average of each answer.

EXTRAS

1. Glossary

- **CAP:** Common agricultural policy supports farmers and ensures Europe's food security. The CAP is a common policy for all EU countries, managed and financed at European level with resources from the EU budget.

- **Farm to Fork (F2F):** The Farm to Fork Strategy (F2F) is the ten-year plan developed by the European Commission to guide the transition to a fair, healthy and environmentally friendly food system.

- **MEC: Minimum Environmental Criteria (MEC)** are environmental requirements established for the various phases of the purchasing process, aimed at identifying the best product, service or design solution in environmental terms, throughout its life-cycle, taking account of availability on the market.

- **MAI**: **Mediterranean Adequacy Index (MAI), whose function is to express the degree of adherence of a meal to the Mediterranean Diet. It does this by comparing the calories, therefore the energy, provided by the different classes of foods present in the dish we consume.**

- **PNRR:** the National Recovery and Rehabilitation Plan (PNRR) is the program by which the government intends to manage the funds of the Next Generation EU. It is the instrument of economic recovery introduced by the European Union to heal the losses caused by the pandemic

Co-funded by the European Union

- **GSP:** Global Soil Partnership. A globally recognized mechanism established in 2012 with the mission of promoting sustainable soil management and ensuring productive soils towards Food Security

2. Acknowledgments

This module has been written by Loreta Grande and Andrea Palmieri, with the support of the SSPICE IT! Team in Italy and Portugal.

3. Bibliography

- International Fund for Agricultural Development (IFAD), https://www.ifad.org/en/

- United Nations Regional Information Centre for Western Europe (UNRIC), *Agenda 2030*, https://unric.org/en/united-nations-sustainable-development-goals/

- Water footprint network, https://www.waterfootprint.org/

- Ecosystems, *A Global Assessment of the Water Footprint of Farm Animal Products*, https://www.waterfootprint.org/resources/multimediahub/Mekonnen-Hoekstra-2012-WaterFootprintFarmAnimalProducts_4.pdf

- European (EC) , *Farm to Fork strategy*, https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en

- European Commission (EC), *The common agriculture policy at a glance*, https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance_en

- European Council of the European Council, *Results of the European Council, 23-24 June 2022 on Food security,*

Co-funded by the European Union

https://www.consilium.europa.eu/en/meetings/european-council/2022/06/23-24/

- Global Footprint Network, *Ecological Footprint Calculator*, https://www.footprintcalculator.org/home/en

- Fischler C., *L'Homnivore. Le goût, la cuisine et le corps*, Paris, Odile Jacob, 1990.

- Damasio A.R., *Descartes' Error: Emotion, Reason, and the Human Brain*, Putnam, 1994; revised Penguin edition, 2005

- Piccinni A., *Drogati di cibo*, Giunti, 2012

Co-funded by the European Union