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Teaching material on Ecological Footprint



LEARNING UNIT 3 – NUTRITION

AGE GROUP 2 (14-18 YEARS)

Version 2 | June 2020



This material is part of a course on Ecological Footprint for students. The course consists of the following modules for two age groups:

Age group 1 10-13 years	Age group 2 14-18 years
Calculator	Calculator
General Introduction	General Introduction
Mini Hectare Workshop	Mini Hectare Workshop
Nutrition	Nutrition
Housing	A. Housing core B. Housing additional
Mobility	Mobility
Other Consumption	Other Consumption
Background information	Background information

You are
here

All the material can be downloaded for free at www.e-co-foot.eu in different languages.

calculator.e-co-foot.eu is an online tool that allows students to log their daily activities and trace the Ecological Footprint of their habits. Group functions for teachers make it suitable for a warm-up or later check-up-session.

elearning.e-co-foot.eu is an e-learning with selected content from the lectures. E-learning can be used for blended learning of this course, as homework or as training and competence check after in-class lectures.

IMPRINT

akaryon GmbH, Austria www.akaryon.eu

Plattform Footprint, Austria www.footprint.at

Colegiul „Vasile Lovinescu” Fălticeni, Romania www.agricolfalticeni.ro

Eötvös Loránd University (ELTE), Hungary savariakemia.elte.hu

Environmental Education Center (K.P.E.) Pertouliou-Trikkeon, Greece <https://blogs.sch.gr/kpepertoul/>

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LEARNING UNIT 3

ECOLOGICAL FOOTPRINT OF NUTRITION

AGE GROUP 2 (14-18 YEARS)

The aim of the Learning Unit is to understand what the Ecological Footprint measures, how big the Ecological Footprint of different food groups is and what impact our diet has on the climate, the consumption of nature's services and on the people of poorer countries.

Short Overview

Duration of Learning Unit: minimum 45 – 55 minutes

If the Learning Units 1 "General Introduction to the Ecological Footprint" or 2 "Mini-Hectare Game" have already been taken, Chapters 3 and 4 can be omitted.

This Unit consist of:

- This PDF document with description of the Unit
- PowerPoint Presentation: [ecofoot Nutrition Presentation agegroup2.pptx](#)
- Optional exercise 1: The Ecological Footprint of your cheeseburger: [ecofoot Nutrition exercise1 agegroup2 Footprint of cheeseburger.pdf](#)
- Exercise 2: Calculate your daily Footprint of your nutrition: [calculator.e-co-foot.eu](#)

Brief description of the Learning Unit:

In the first exercise, "Our approach to food", students deal with the issue of food by first estimating the amount of food wasted and discussing the effects of this in. The students get to know the measuring unit of the Ecological Footprint: area. Behind every kind of food there is a production chain that begins with a field and at each transport and processing step, area is consumed and CO₂ is produced. Then the different areas we consume in everyday life are described and how much bio-productive area is available on Earth. How little soil there is, the basis of mankind, it is shown and explained by means of a graph how little soil (basis of all vegetation) there is available. The students learn, why the Ecological Footprint of animal products is so big and how they can reduce their Ecological Footprint of Nutrition.

Setting: classroom

Overview of contents:

	estimated duration minutes
1. Our approach to food	7 min.
2. The Ecological Footprint of a roll	3 min.
3. optional: What does the Ecological Footprint measure? – repetition from Unit 1	(3) min.
4. optional: How much productive area do we have available? - repetition Unit 1	(3) min.
5. How much soil do we have?	2 min.

- | | |
|---|-------------|
| 6. Areas for livestock - what does my hamburger have to do with the rainforest? | 9 min. |
| 7. Estimation game world scale | 9 min. |
| 8. What can WE do? | 9 min. |
| 9. Estimation game: Beef schnitzel Footprint quiz | 9 - 10 min. |
| 10. Food recovery hierarchy (if more than 1 lesson is available) | |
| 11. Exercises optional: | |
| - Exercise 1: The Ecological Footprint of your cheeseburger: | |
| - Exercise 2: Calculate your daily Footprint of your nutrition | |

Items:

two white A3 sized papers, beamer (also possible without beamer), printed quiz-sheet: see the last page, also possible without printed sheet

Connection to subjects: geography, biology, science, environmental sciences, national language, religion, English as a foreign language, nutrition and household, project lessons, mathematics, ...

E-learning: <https://elearning.e-co-foot.eu/>

Sequence:

The spoken text of the teacher is in blue colour. The explanations of what the teacher does are written in black.



Today we will talk about the Ecological Footprint of our food.

1. Our approach to food

Our approach to food

How much food do you suppose is thrown away?


0 10 20 30 40 50 % ?

Does it matter that so much food is thrown away?

If so, why?

What is being wasted?

- Ressources (water, fertilizer,...)
- Energy for production, harvesting, processing and transport
- Cultivation area



How much food do you suppose is thrown away? Please make a percentage estimate of what you believe. Here on the ground is an imaginary line and you please line up along this imaginary line as follows: If you believe that no food is thrown away, stand at this end of the imaginary line - so here is the number zero percent. Those who believe that a great deal, namely 50%, will be thrown away, stand at the other end of this imaginary line and the others in between.

The students line up along the line according to their estimates...The teacher responds to the estimates and then names the solution: **About one third of all food is never eaten in our country and in Europe!**

Does it matter that so much food is thrown away? Yes? Why does it matter? The students list reasons why food is valuable and should not be wasted. What else is unnecessarily consumed when food is thrown away? The students list various things. Yes, the production of food consumes raw materials such as water, fertilizers, pesticides. Furthermore, a lot of energy is used for cultivation, harvest, production, processing, packaging, transport, ...

And land is also used - land for cultivation, but also land for transport and processing.

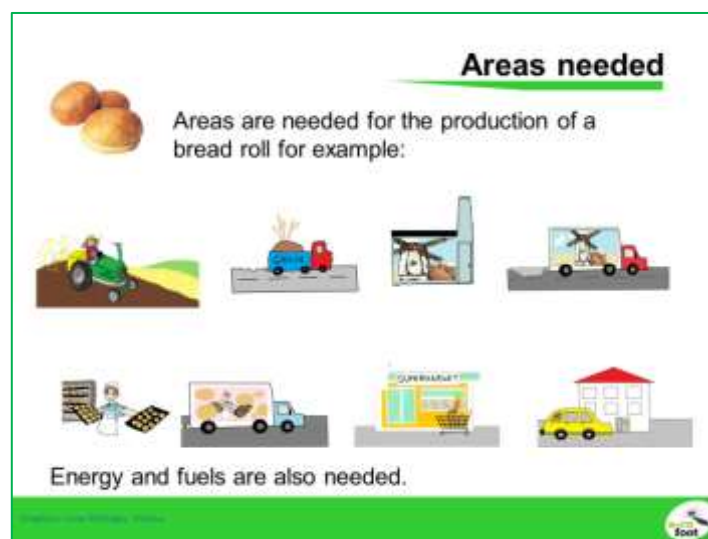
Take bread rolls, for example: What land is used in the production of bread rolls?

2. The Ecological Footprint of a roll

Which kind of area is needed, from the beginning, when rolls are produced, until the moment we can eat it? Here you can see the main areas of the production of a bun.

The teacher goes through the areas needed for the production of a bun:

1	Field	7	truck transport of flour to the big bakery
2	agricultural machinery that plows, sows and fertilizes	8	wholesale bakery
3	fertilizer production	9	transport of bakery products
4	agricultural machinery for harvesting	10	bakery shop
5	truck transport of grain to the mill	11	car transport home
6	grain mill	12	eat rolls

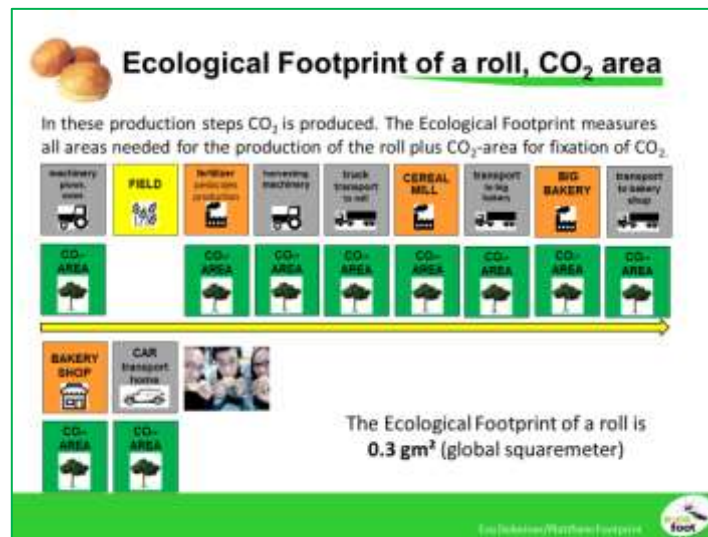


With all these production steps machines are used and energy is needed.

Energy is used in the form of fuels for the combustion engines of vehicles and machines and in the form of electricity, which is also partly produced from fossil fuels. This produces exhaust gases such as CO₂, which is increasing in the atmosphere and thus heating up the climate. Food production also produces "worse" greenhouse gases such as methane and nitrous oxide as a result of nitrogen fertilisation, humus decomposition and livestock farming in industrial agriculture.

Trees and plants can bind CO₂ because they "feed" on it during daylight (by photosynthesis).

The **Ecological Footprint of a product** includes all required areas plus all areas needed for fixation of CO₂ in the form of forest.



RPT
of Unit 1

We sum up all these areas and get the Ecological Footprint of the roll.

(S)he picks up two white sheets of A3 paper and spreads the sheets side by side on the floor. These are the global square meters needed to produce a roll. The Ecological Footprint of a bun is 0.3 global m² – just for one roll!

We do not eat only one roll, but many of them and many other things as well. Every single one of us Austrians consumes around 2 global hectares in one year for our food and drink - that's 20,000 global m²! That means, each of us needs about 2 football fields per year for his / her nutrition.

3.

optional: **What does the Ecological Footprint measure?**¹

– repetition of Unit 1

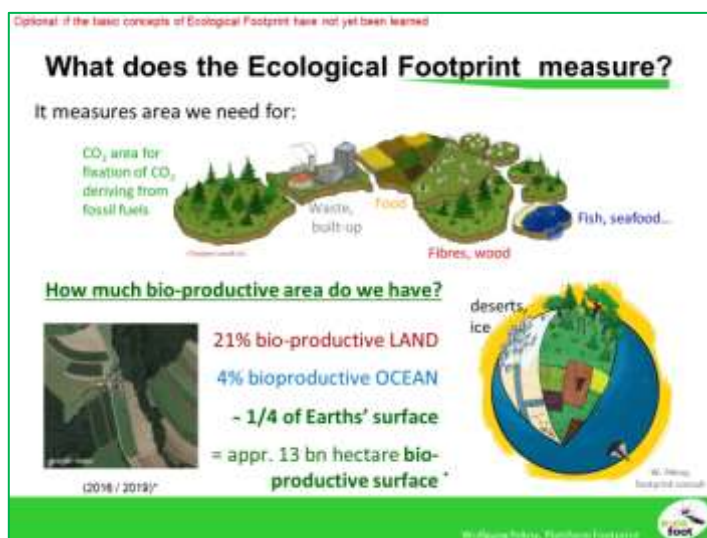
RPT
of Unit 1

The Ecological Footprint also measures the areas we use for our other fields of life: housing, driving and flying, and for the many things we buy in a year. For all together we Austrians consume on average 6 global hectares per year. Our diet accounts for a third of this.

Why is it important how big our Ecological Footprint is? And why is it even called GLOBAL square meters or GLOBAL hectares?

Because there is only a specific area for us humans on our GLOBUS that we can use.

¹ If the Ecological Footprint has not yet been covered in class in previous learning units.



4. optional: **How much productive area do we have?** – repetition of Unit 1

RPT
of Unit 1

About two thirds of Earth's surface is covered with water (seawater) and one third of Earth's surface is land.

But from this land area we cannot use the land covered with ice and deserts to grow food or wood or cotton because they are not bio productive. Only a very small proportion of the oceans is bio productive, namely 4%. In total, around a quarter of Earth's surface can be used by us. And with this area, all the people that exist on Earth have to get along. Currently, about 7.5 billion people live on Earth, and this number is constantly increasing. What does not increase is the area available for us to live on.

5. **How much soil do we have?**

Now let's see how much soil we have. Imagine we scrape together all the soil that exists on Earth. Then it would make a bullet of this size.²

The teacher points to the brown ball on the PowerPoint slide.

² Calculated by Wolfgang Pekny, inspired by the computer graphics of water and air by physicist Adam Nieman



Who knows what soil is? ... This is the loose, fine-grained material that covers the solid rock below our feet. This little ball is the livelihood of all mankind! Because without soil no plants grow and without plants there is no on land grown food.

And how much humus is there? Does anyone know what humus is? This is the dark part of the topsoil, which contains many nutrients and makes the soil fertile. If we formed all the humus that exists into a ball, then this ball would have a diameter of only 18 km and would be so small. The teacher points to the yellow ball on the PowerPoint slide. Humus is reproducing, but much slower than we "degrade" it. In a forest or in old grassland the humus content is stable, through industrial agriculture humus is degraded. Organic farming uses natural substances and processes and enhances soil fertility and humus building.

It takes at least 100 years for 1 cm of soil to form. And we humans are dealing with the soil as if we had so much of it! In Austria, over 10 hectares of soil area are taken away every day³, which is about 14 football fields! So much productive area has to give way to new roads, parking lots, houses or shopping malls every day and valuable soil layers are destroyed. But soil is precious - without it we cannot survive.

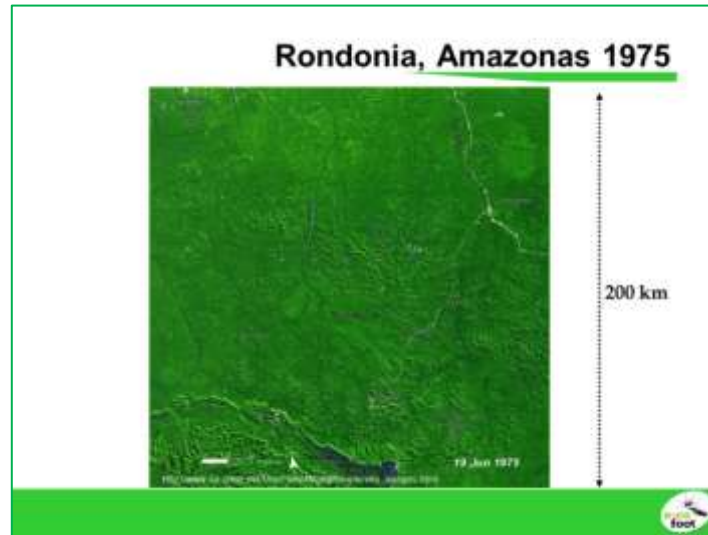
While the number of people on Earth is increasing, the productive areas on Earth don't grow - on the contrary! They are getting smaller and smaller.

If you want to know more about organic farming: https://ec.europa.eu/info/food-farming-fisheries/farming/organic-farming/organics-glance_en

³ Umweltbundesamt (Environmental Agency Austria): Average of three-year period 2016-2018: 11,8 ha/day

6. Areas for livestock - what does my hamburger have to do with the rainforest?

Here I have a satellite picture from South America for you. What can we see in this picture? ...



Green rainforest in the Amazon, photographed from above in 1975. This white, thin line, which can be seen on the top right, is a road. The only one! Otherwise there is only rainforest here. And now I'll show you the next picture that shows exactly the same section, but 26 years later:



What is different? The teacher shows the previous picture again, then the new one. What happened in the meantime? The many white lines are roads and cleared forest areas. When we get closer, it looks like this:



Rain forest is burned down to create agricultural land. Where once was lush rainforest...
Only soybeans are grown!

Where once was lush rainforest,



Where once was lush rainforest,



*... only soy is grown for the feed of
our farm animals*

Where once there was a huge biodiversity with many different animals, plants and indigenous people most of the time only one single plant is grown: soy! The soybeans serve as fodder for farm animals: for chickens, pigs and cattle.

Why are our farm animals not fed with grain from their own country or from Europe? ... The students answer ... Because we have so many farm animals that we could not feed them from the grain that grows on our continent. In Austria, for example, about 3 million pigs and over 15 million chickens live.⁴ We would then have no more grain for our bread. We could therefore say that our farm animals graze in South America!

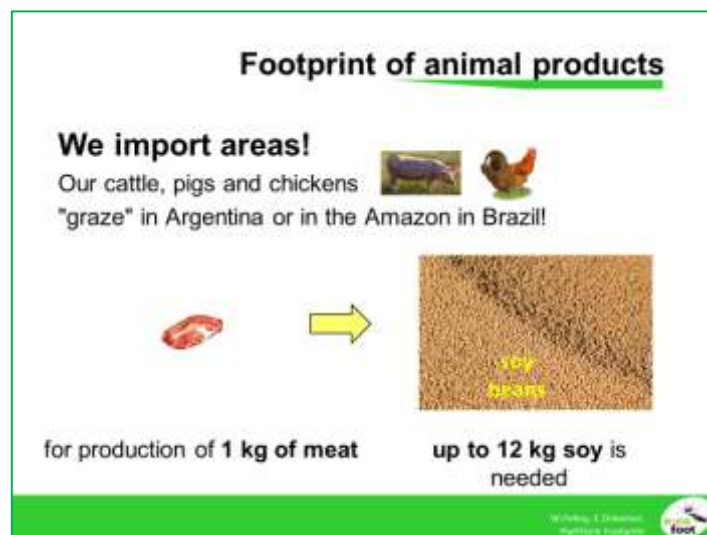
What was agriculture like before? Where did the farmers in earlier times get the food for their cattle, pigs and chickens? Exactly! From the own meadows and fields, which belonged to their own farm. It used to be that farmers did not have as many animals as they do today. Today, the animals eat the food that is grown in Brazil or Argentina and transported across this vast distance across the Atlantic Ocean (except in traditional farming).

Furthermore, you need about 12 kg of soybeans to produce 1 kg of meat.⁵

The second reason our livestock are fed soy is that the soybean contains so much high-quality protein that the animals grow the fastest. The farmer can thus produce the cheapest meat. Because most customers in the supermarket only want to buy cheap meat! To the suffering of the animals, soy is also no species-appropriate food.

If you want to know more about soy production and its impacts on the environment:

<https://worldinfo.org/2012/01/food-for-thought-soybean-endangers-brazil-amazon-rainforest/>



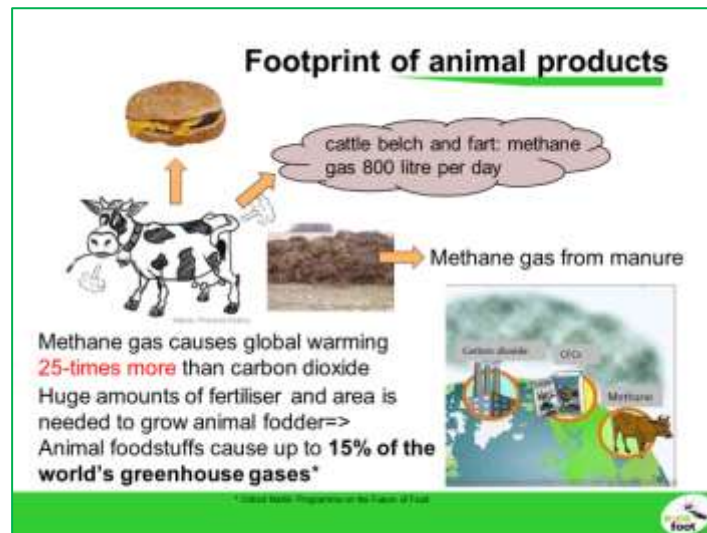
⁴ Grüner Bericht 2017, bmlfuw.gv.at

⁵ https://www.regenwald-schuetzen.org/fileadmin/user_upload/pdf/Projekt/Weil-wir/Fleisch/weil-wir-es-wert-sind-zahlen-fakten-fleischkonsum.pdf

Why do we have so much more farm animals today than we used to? Because we eat so much meat! Our great-grandparents or grandparents used to eat meat about once a week - Sunday roast on Sunday. Most of us eat meat or sausage or cheese every day.

And we also eat a lot of dairy products: milk, cheese, cream, yogurt, butter or cream cheese are served every day.

Meat and fat dairy products have the BIGGEST Ecological Footprint, with beef having the biggest of the big Footprints. One reason for that is, that cattle burp and fart (LOL).



Cattle produce methane and this gas causes climate warming 20-times more, than carbon dioxide. Now you're probably thinking, what can a little cow burp make out?

But a cattle farts and burps 800 liters of methane per day. How many cattle are there in the world, what do you think? ... the students estimate 1.3 billion!

Cattle produce a significant part of the world's greenhouse gases. The climate-effective gas methane is produced during the digestion process of ruminants (cattle and sheep) and during the storage of manure (solid manure, liquid manure). Also huge amounts of fertilizer is used to grow the animal feed. Animal products account for about 15 percent of man-made greenhouse gas emissions, if we add up methane emissions, transport routes, fodder production and other factors that play into the keeping of livestock. ⁶

Meat and animal products have an enormous Ecological Footprint and huge greenhouse gas emissions - as much as the total global traffic!

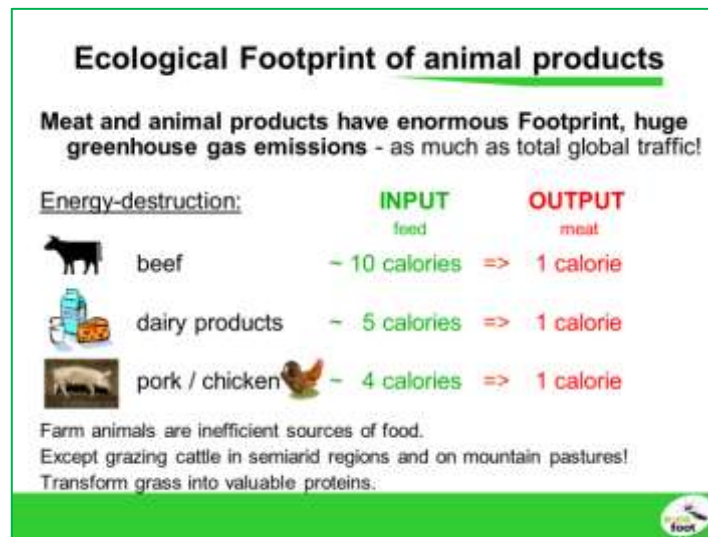
Worldwide we consume twice as much meat today as 50 years ago. ⁷

Austria is a country of meat lovers; in the EU we occupy 3rd place with our meat consumption (behind Luxembourg and Spain). Every year an average of 65 kg of meat is eaten by each individual. That is about five portions of meat per week. ⁸

⁶ Dr. Marco Springmann, Oxford Martin Programme on the Future of Food ,
<https://www.welt.de/kmpkt/article171128188/Das-wuerde-passieren-wenn-wir-alle-sofort-aufhoeren-wuerden-Fleisch-zu-essen.html>, 2017

⁷ <https://www.global2000.at/fleischkonsum-Österreich>

⁸ <https://www.global2000.at/fleischkonsum-Österreich>



In the meat production you have a high input of energy in form of animal feed and a small output in form of meat. For the production of beef, the most input is needed: with 10 calories of animal feed only 1 calorie of meat is produced. For the production of dairy products you need an input of about 5 calories, to produce 1 calorie of a dairy product and for pork or chicken meat, you need about 4 calories input of animal feed.

Animals are inefficient sources of food. Much of the energy they consume is used in metabolism and cellular respiration.

They need a lot of area: from one hectare of land you can either feed one cow for one year or produce for example 30 tons of potatoes.

If the entire grain harvest in the world would be used directly as food for humans and no grain at all would be fed to cattle, pigs or poultry, then four billion more people in the world could be fed.⁹ That does not mean, that we should not eat animal products any more, but this number shows us, how big the effect of reducing animal products in our diet is.

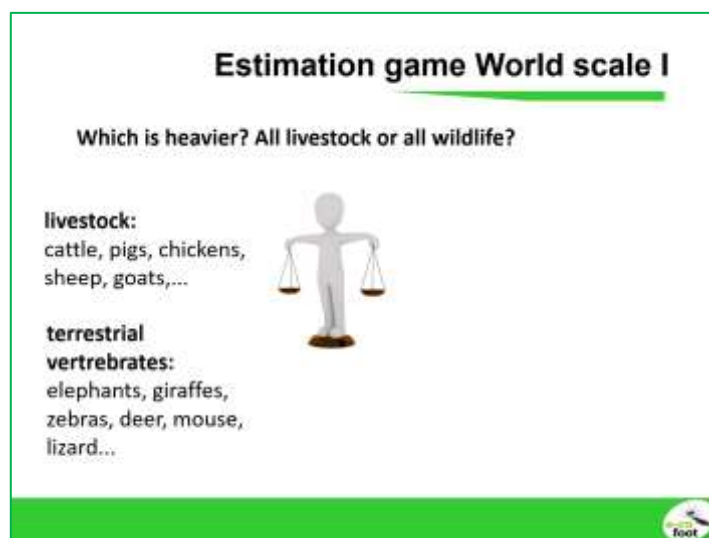
There are regions and countries in the world, where no agriculture is possible (e.g. mountain pastures in the Alps or steppe in Mongolia, Tibet). In these countries cattle is an important livelihood for the people. It can transform grass, which can't be eaten by man, to valuable proteins. Extensive and pastoral production systems with cattle and small ruminants play an important socio-economic role in the arid and semi-arid regions of the world.¹⁰

7. Estimation game world scale

Now let's see how many animals there are in the world at all. We're now playing a guessing game where I'm the world scale and we estimate the weight of the animals in the world.

⁹ <https://www.spiegel.de/wissenschaft/mensch/heutiges-ackerland-koennte-vier-milliarden-menschen-mehr-ernaehren-a-914457.html>, 2013

¹⁰ <http://www.fao.org/animal-production/en/>




The teacher stands with arms spread out to the side, similar to a balance, with the palms facing upwards, representing the scales. In one pan, I weigh **all livestock** on Earth. Do you know what farm animals are? The pupils list livestock. Yes, these are all animals that we eat and whose milk or wool we use: cattle, pigs, chickens, sheep, goats. And in the other pan - the teacher points with his second palm - I weigh all the wild animals on earth that live on land and have a spine: elephants, giraffes, zebras, deer and so on to the mouse and the lizard. What do you think is heavier? All livestock or all wildlife?

1. If you think that livestock are heavier, please stand up. ... some students get up. Those who stand are right!
2. But please keep standing, because now I ask you: how MUCH heavier do you think livestock are, than the wild animals? Anyone who thinks that farm animals are **more than twice as heavy** remain standing, the others sit down. ... individual students sit down. Those who stand are right again!
3. And I ask you further: Who believes that the farm animals are **more than FIVE times as heavy** as the wild animals, remain standing, the others sit down. ... individual students sit down. Those who stand are unfortunately right again!
4. And those who believe that farm animals in the world are **more than TEN times as heavy** as wild animals continue to stand. ... The teacher waits until the surprised pupils decide. Those who stand are pessimists and are right!
5. I keep asking: who of those who are still standing believe that the farm animals of this world are **TWENTY-times as heavy** remain standing ... YOU are right! The students are usually surprised. It is hard to believe, but the mass of our farm animals is twenty times as big as the mass of all wild animals! Only 5% of all animals that live on land are wild animals (only the animals with a spine were included, no snails, worms, insects, etc.).

Estimation game World scale I

Which is heavier? All livestock or all wildlife?

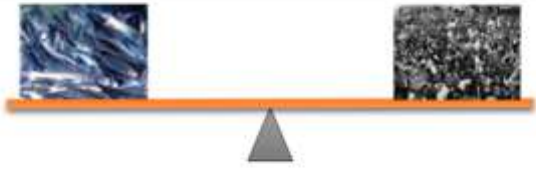


Solution:
The biomass of **farm animals** exceeds the mass of all wild terrestrial vertebrates **by 20-times!**
V. Smil „The Earth's Biosphere

The biomass of farm animals exceeds the mass of all wild terrestrial vertebrates twentyfold.
The world has become a huge farm, an oversized farm and a very poorly managed farm!

Estimation game World scale II

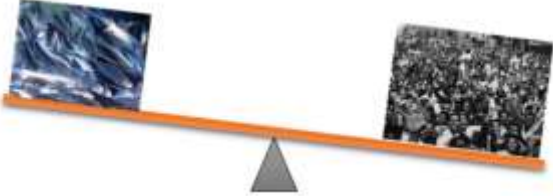
Which is heavier? All fish or all humans on Earth?



What about the animals in the water, namely the fish in the sea? How much fish is there? I'm the world scale again - the teacher spreads his/her arms on both sides like a scale with two weighing pans. In one balance I weigh all the fish in all the oceans of Earth and in the other I weigh all humans on Earth. Which is heavier? All fish or all humans on Earth? Those who believe that people are heavier stand up Pupils think - some get up. Those who stood up are right! The mass of humans exceeds the mass of all fish in the seas by 10-15%.

Estimation game World scale II

Which is heavier? All fish or all humans on Earth?



Solution:
The mass of people exceeds the biomass of fish in the seas **by 10-15%**


Was it always like that? No, probably some pupils answer. No, of course not. For centuries and millennia there were more and more fish in the sea than humans. This changed in the middle of the nineties. What do you think, why?

The students give reasons. One reason is overfishing by industrial fishing. If you have one kilogram of fish on your plates, in addition up to 6 kg of other sea animals have died. This is called bycatch. These animals are caught together with the fish and thrown back dead into the sea. In sustainable fishing, you only try to catch the fish you really need. There is this MSC seal (the teacher points to the blue symbol) found on the fish packaging in the supermarket. If you keep attention to buying fish with this seal, you have probably saved some sea creatures, that didn't end up as by-catch.

Optional: The next question to estimate: What is heavier: all cars produced in 1 year (including trucks and buses) or all milk which is milked in 1 year in the whole world? Those, who think the vehicles are heavier, **stand up**. Students estimate and some stand up, some not. **The milk is heavier!!**

Estimation game World scale III

Which is heavier? all cars produced in 1 year or all milk produced in 1 year?



All milk produced in one year in the world is heavier than all vehicles produced in one year

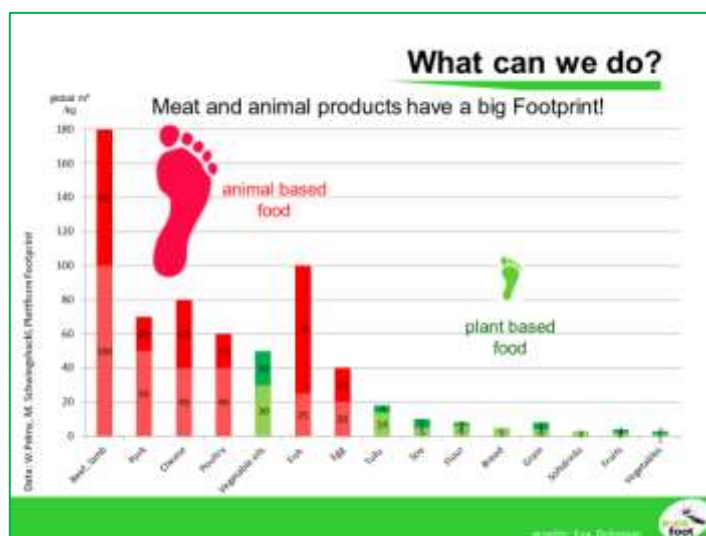


Most of you have a wrong picture of the world. It does not matter we all learn new things every day. Here you can see a different map of the world you are used to: the Peters Projection map presents countries in their true proportion to one another. You normally see Mercator projections, and this overemphasizes the size of Europe. What you see here is an equally correct image of the world, as something is always lost when you transfer a three-dimensional globe to a two-dimensional map. Most people have a wrong picture of our world – that is why your estimations in world scale game were not correct. We think the world is a vast wilderness with a few patches of cities, settlements and industrial areas in it! It is exactly the opposite. There are no spots that are uninfluenced, only a few natural areas left that humans did not change massively and where nature can develop. The world has become a huge farm, an oversized farm and a very poorly managed farm!

8. What can WE do?

How can we reduce our Footprint in our diets?

We have already heard today that we need land for our food and that humanity can use only a quarter of Earth's surface. To produce meat, we need FIVE to TEN times more area, than for the production of plant-based food. The following picture shows us the big difference of the Footprint of meat and animal products and plant-based food.



The reason, why there are 2 columns for each food (Beef = 100 and 180 gm²/kg) is, that the Footprint depends on the type of animal husbandry and on the way the food is produced. E.g. fish, which is fed with other fish (salmon) has a higher Footprint, than fish, which is fed with plants (pangasius) or fish, which is not fed at all because it is a wild fish (sardine, herring).

Bread has a higher water content than flour or grain, this is why the Footprint of bread is smaller.

Vegetable oils are mostly used in very small quantities compared to the other food.

If all people in the world lived like us in Europe, then we would **need THREE planets like the Earth!** Do we still have a planet in reserve somewhere? ... Do you know a planet where there are still bio-productive areas? No, there is no one that could be available in the foreseeable future! Therefore, we humans on Earth have to get along with the area we have.

How can we use less land in our diet and reduce our Ecological Footprint? ...

What can we do?

Reduce Ecological Footprint of nutrition:

- 1. Reduce meat, eggs and milk products (especially fat milk products)**

You don't need meat to become strong

You need proteins that can come from plants



1. We eat LESS meat and animal products! That is the most important point of today's lesson.

As an adult you can choose a **vegan** diet, which has the greatest effect on your Footprint. A balanced, healthy diet is also possible as a vegan if you are well informed, select the individual components of a meal and put together the entire diet correctly. As a child you should not become a vegan so that you

get all the necessary ingredients for your adolescence and stay healthy. The lesson learned should be especially for kids, not to avoid animal products but to reduce them, because eating meat every day is certainly not healthy and bad for the planet.

Many people and men think that you have to eat meat to get muscles, but this is not true. You have to eat proteins to get muscles, but the **proteins** don't have to come from animals. The strongest animals in nature are pure plant eaters, like the elephant for example. Also the strongest man in Germany is vegan¹¹ and some competitive athletes.

Vegetarians do not eat meat or fish. However, their Ecological Footprint is only smaller than that of meat eaters if they also reduce cheese, dairy products and eggs.

If you eat meat, you can remember the following rule of thumb: The smaller an animal is, the less Ecological Footprint it has. You can also reduce your Ecological Footprint a bit by eating poultry instead of beef.



2. We can also downsize our Ecological Footprint, if we choose a season-compliant and local food.
 - What is local food? If the students can't figure it out for themselves: these are foods that were produced in the region and have a short transport route or come from your own garden.
 - What does season-compliant mean? If the students do not come up with it by themselves: If we eat those fruits and vegetables which are just ripe. For example, strawberries in May. Or grapes in September, October. We also call them seasonal fruits and vegetables. When we eat strawberries in November, they come from far away from a country where it is warm in October or November, or from a heated glasshouse, and therefore they have a particularly large Ecological Footprint. "Eat seasonably now" offers a calendar, where you can look up, which food is seasonable at the moment: <http://eatseasonably.co.uk/what-to-eat-now/calendar/>

What else could we do to reduce our Ecological Footprint of nutrition?

Buy organic food or harvest fruits and vegetables from the garden. It does not have to be your own garden. In parks or on country roads we often can find fruit and nut trees; picking wild herbs from a meadow for the salad.

¹¹ Patrik Baboumian

Organic food is produced without artificial fertilizers, herbicides and insecticides (pesticides). It generally has a Footprint that is about 10% smaller (except meat). Organic-certified farms must use natural methods for soil fertilisation, weed prevention and pest control. Antibiotics, growth hormones and genetically-modified feed cannot be used to raise food animals, and there are standards of care which prevent cruelty to livestock. Livestock are able to go outside or roam the fields and eat their natural food – grass for cattle – rather than being force-fed with corn.

3. **Don't waste food.** In Austria and in the EU almost one third of all food is thrown away. This happens not only at home but also in the supermarket and at the wholesaler.



How could this be avoided? The pupils bring ideas.

- To withhold consciously on special offers such as "Buy 1 get 1 free!"
- Only buy what we really need
- Write a shopping list at home before shopping
- Food beyond the expiration date is not automatically spoiled, trust your senses!
- If you go to a restaurant and the portions are too big ask them to pack the rest for taking home
- ...

With these measures, we can avoid food waste at source, where food is put into circulation.

If we throw away food, not only waste is generated that has to be disposed of, but we also wasted the Ecological Footprint which resulted from cultivation, transportation, processing and storage of the food.

Along the production and supply chain of our food, quantities that have been spoiled, unattractive for sale, inadequate etc. or produced too much are disposed of. Even though we usually do not see these quantities, they leave an Ecological Footprint. The better the supply chain is organised, the lower it is, but for some foods the proportion of food thrown away is almost half of our direct influence.

The proportion of food thrown away at home is usually lower and can of course be optimized.

We can collect the vegetable waste produced during cultivation, sale or cooking as organic waste and throw it onto a compost heap or into a composter. There, with the help of microorganisms, compost soil is produced which is worked into the soil. The result is humus, which keeps the soil fertile.

If you want to know more: out of “Background Information on the Footprint concept”, <https://www.e-co-foot.eu/materials-downloads/>

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The proportion of food thrown away at home is usually lower and can of course be optimized.



Here you can see a food pyramid. What does this illustration mean? ...the students answer...

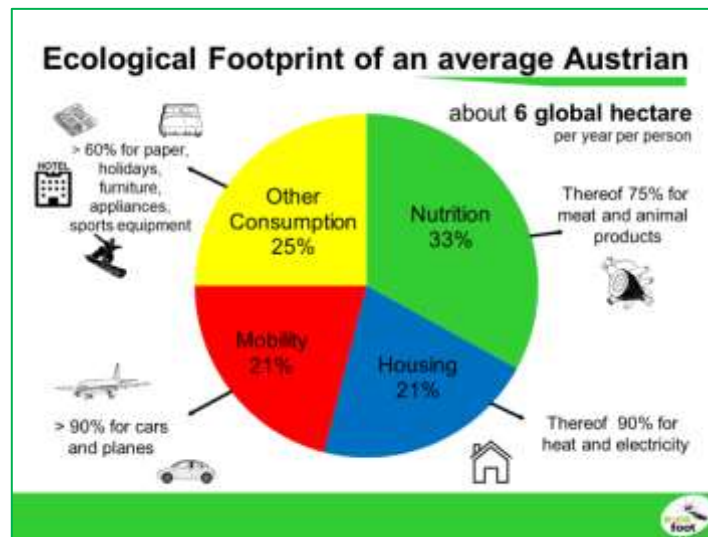
It was developed by health experts and shows what a healthy diet looks like. The foods you should eat often form the broad base of the pyramid: carbohydrates such as cereals, bread, potatoes, rice, noodles, and legumes. The narrower the pyramid becomes towards the top, the less one should eat of the food shown.

This advice for a healthy diet also largely coincides with the advice for a diet with a smaller Footprint. Animal foods are higher up in the pyramid, which means that eating less animal products is good for the environment and your own health. (One exception is sugar, which as a plant-based food has a small Footprint but is still at the top of the food pyramid.)

Every time we eat, the whole world is at stake! Several times a day we have the opportunity to act responsibly by eating food with a small Ecological Footprint.

A small step ALL people take towards a healthier and less thickening diet is more effective than an extreme step of a few.

But we do not only cause our Ecological Footprint through our diet, but also through the housing, the mobility and the other things we buy or consume. The average **Ecological Footprint of an Austrian is 6 global hectare** per person per year and looks like this:



RPT
of Unit 1

The teacher explains the graphic presentation.

Nutrition has the biggest part of the Ecological Footprint of an Austrian, thereof 75% for meat and animal products. The Footprint of housing is mostly caused by heating and electricity. More than 90% of the mobility Footprint comes from driving and flying. Within the category Other consumption paper, holidays, furniture, appliances and sports equipment have the biggest Footprint.

There are five Footprint rules to successfully shrink the Footprint in the other areas as well:

The teacher lists the 5 Footprint rules using the PowerPoint slide:

The most important things YOU can do!

- E**njoy life with a smaller footprint: more friends, family, time, fun.
- A**ct together to create a sustainable world that supports living on a small Footprint!
- R**educe meat and animal products! Prefer seasonal and local products, as much as possible from organic farming.
- T**ravel with a small Footprint – by train, bike and bus. Don't fly! Ride cars less, never alone, with green electricity!
- H**ome green home! with green energy, well insulated, smaller, access to public transport

RPT
of Unit 1

Earth could feed ALL people on Earth much easier if we changed our eating habits in the developed countries and if we reduced our Ecological Footprint according to the 5 Footprint rules. You and your children and all the people on Earth will have a bright future! In this sense – always remember in your future meals what you have learned today!

9. Game: Beef Steak Footprint Quiz

Duration: about 10 minutes. The students build small groups.

Optional offline version without printing the quiz sheet: the teacher shows the PowerPoint slide and the students are asked one estimation question by the other and tell their answers one after the other.

Offline version with printed quiz sheet: each group gets the following sheet from the teacher, which she/he had printed out before (see: Materials for print at the end of this document):

Beef Steak Footprint Quiz


Footprint can compare very different things:

1kg beef steak leaves the same footprint as ...

... ca	weight potatoes
... ca	time in a plane
... ca	distance in a middle class car
... ca	distance by train (in EU)
... ca	weight paper (fresh)
... ca	glasses of softdrink (0,25 l)
... ca	time laptop-use
... ca	time laptop-use with green electricity
... ca.	pieces plastic shopping bags

values according to calculations of the author

Wolfgang Poling, Planetary Footprint



The students get 5-6 minutes to estimate and discuss within their groups and write their answers into the empty space. When everybody is finished with estimating and filling in the numbers the teacher asks the pupils, what they have estimated: **How much potatoes have the same Footprint than 1 kg beef?** The groups tell their estimated values. Then the teacher shows the result. The group, which guessed right or is the closest to the right value gets one point. Then the teacher asks the next question and so on.

Resolution of the quiz:

Beef Steak Footprint Quiz


Footprint can compare very different things:

1kg beef steak leaves the same footprint as ...

... ca	50 kg	weight potatoes
... ca.	8 min	time in a plane
... ca.	200 km	distance in a middle class car
... ca.	1500 km	distance by train (in EU)
... ca.	6 kg	weight paper (fresh)
... ca.	150	glasses of softdrink (0,25 l)
... ca.	15 weeks	time laptop-use
... ca.	20 weeks	time laptop-use with green electricity
... ca.	600	pieces plastic shopping bags

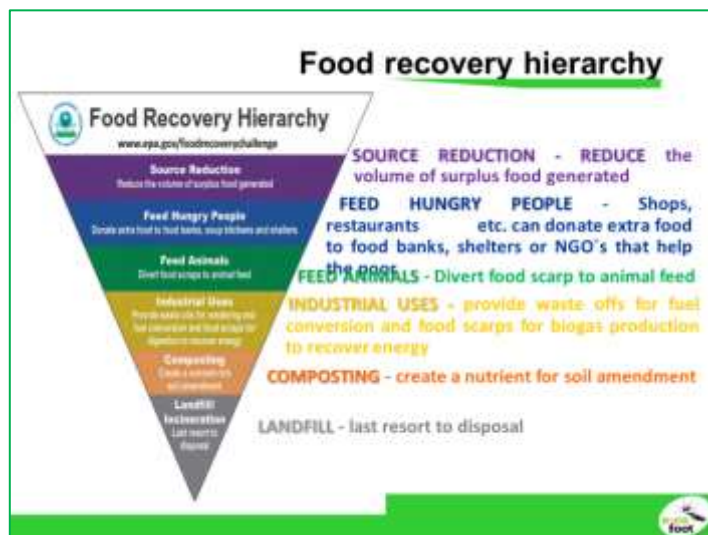
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Wolfgang Poling, Planetary Footprint



10. Optional: Food recovery hierarchy

If there is more than one lesson available, the teacher can talk with the students about ranking the priorities from avoiding food waste at source to meaningful use to at least disposing as waste.



Exercises

11. Exercise 1: The Ecological Footprint of your cheeseburger

The worksheet is in the zip-file, named as follows:

[ecofoot Nutrition exercise1 agegroup2 Footprint of cheeseburger.pdf](#)

Duration: about 25 minutes

Aim of the exercise: to learn how great the influence of animal ingredients in a product is on the overall Ecological Footprint of the food and to realize, what difference the choice of different meat types and the cheese makes.



jv.wikipedia.

Setting: classroom (possibly PC lab or students' Smart phones)

The students calculate roughly the Footprint of a cheeseburger or hamburger. They use a given table with Footprint values for single foods or food groups (beef, bread, vegetables, ...). They look the weights of the bread, the meat, cheese etc. up in the internet (e.g. Hamburger from a Fast food chain) or estimate or weigh the weights of the bread, the meat etc. They use the average numbers of the global square meters (gm²) of the table.

Students must try to reduce the cheeseburger's Footprint by changing its ingredients. Look at the graphic. What else can you choose instead of beef to reduce the Ecological Footprint of your hamburger? Pork, poultry, fish, tofu?

12. Exercise 2: Calculate your daily Footprint of your nutrition

<https://calculator.e-co-foot.eu/>

Sources and Bibliography

Footprint data: 2019/2016 Global Footprint Network.
Plattform Footprint (Austria)

Sources for all pictures can be found at the end of the PowerPoint slides.

13. ANNEX FOR PRINTING: Optional sheet for “Beef Steak Footprint Quiz” game

Beef Schnitzel Footprint Quiz

Ecological Footprint can compare very different things:

1kg beef schnitzel leaves the same footprint as ...

- ... ca. weight potatoes
- ... ca. time in a plane
- ... ca. distance in a middle class car
- ... ca. distance by train (in EU)
- ... ca. weight paper (fresh)
- ... ca. glasses of softdrink (0,25 l)
- ... ca. time Laptop-use
- ... ca. time Laptop-use with green electricity
- ... ca. pieces of plastic shopping bags

Beef Schnitzel Footprint Quiz

Ecological Footprint can compare very different things:

1kg beef schnitzel leaves the same footprint as ...

... ca.	50 kg	weight potatoes
... ca.	8 min	time in a plane
... ca.	200 km	distance in a middle class car
... ca.	1500 km	distance by train (in EU)
... ca.	6 kg	weight paper (fresh)
... ca.	150	glasses of softdrink (0,25 l)
... ca.	15 weeks	time Laptop-use
... ca.	20 weeks	time Laptop-use with green electricity
... ca.	600 pieces	of plastic shopping bags

values according to calculations of the author

Wolfgang Pekny, Plattform Footprint