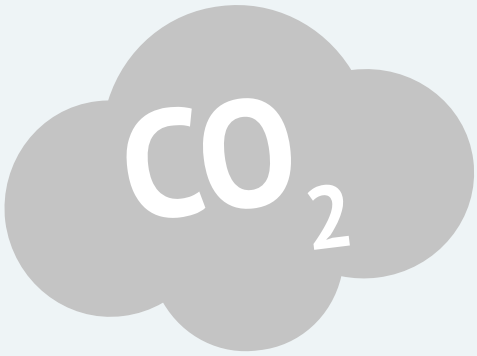



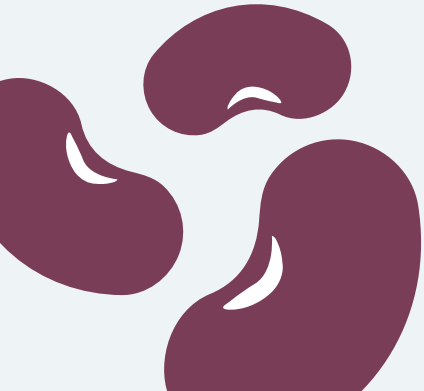
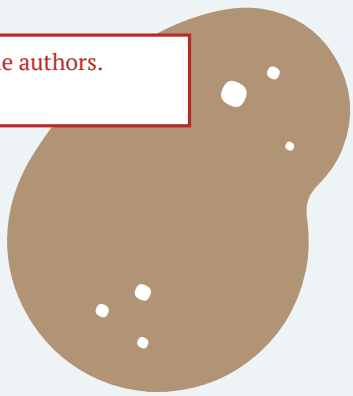




Climate education for reducing household food waste

A HANDBOOK FOR EDUCATORS

AI-GENERATED TRANSLATION of the German original (FoodLabHome 2020). Not reviewed by the authors. Where the versions differ, the German original applies. See page 2.

FOOD LAB HOME

About this English edition

This is an AI-generated translation.

This English edition is a translation of the German handbook *„Klimabildung zur Reduktion häuslicher Lebensmittelabfälle – Ein Handbuch für Multiplikator*innen“* (FoodLabHome project, Leuphana University Lüneburg and Technische Universität Berlin, 2020). It was produced in November 2026 with an AI system (Claude, Anthropic) and has **not been reviewed by the original authors or editors**. It may contain errors or inaccuracies. Where the two versions differ, the German original applies.

Changes compared with the original: links and QR codes that pointed to www.foodlabhome.net now lead to the FoodLabHome pages on sustainability-education.net, where the English materials, the Food Waste Tracker and the online module can be found. Chapter 4 describes the Food Waste Tracker as it worked in 2020; the current version may differ. Names of German organisations, studies and websites as well as the references have been left in the original. Most of the sources cited are in German.

German original: bne-sachunterricht.de/foodlabhome-material
English materials: sustainability-education.net/foodlabhome-materials

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Imprint

Climate education for reducing household food waste – A handbook for educators.

This handbook was produced as part of the project "FoodLabHome – Climate education for reducing household food waste".

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Gefördert durch:
Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit
aufgrund eines Beschlusses des Deutschen Bundestages

NATIONALE KLIMASCHUTZ INITIATIVE

Funded under the National Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

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If in doubt, please contact FoodLabHome@leuphana.de.

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The following abbreviations and formulas are used in this handbook and partly also in the materials:

CO2eq	Carbon dioxide equivalents
FW	Food waste
GHG	Greenhouse gases
Ps	Participants

For a better overview, many notes in this handbook are marked with symbols. They have the following meanings:

Symbol	Meaning
	Materials required
	Duration of the unit
	Online resources
	Food Waste Tracker
	Further information
	Input
	Measuring workshop or measuring phase at home
	Room arrangement (e.g. circle of chairs, group tables)
	Tips for educators
	Links
	Task for home
	Worksheet
	Individual work
	Small-group exercise
	Group exercise

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1. Introduction

In Germany, almost a third of the food produced for human consumption is lost between field and plate. This corresponds to 18 million tonnes of food per year that are produced with great effort and resources and ultimately end up in the bin somewhere along the value chain. More than half of this food waste (FW), almost 10 million tonnes, would be avoidable. Producing these avoidable losses alone takes up an area of 2.6 million hectares and emits 22 million tonnes of greenhouse gases (GHG) (WWF 2015). Food waste is therefore highly relevant to the climate.

Most food is thrown away in private households, which produce an average of around 82 kilograms of food waste per person per year. Deducting unavoidable waste such as stones or bones leaves 53 kilograms that would be avoidable and is therefore actually wasted (Kranert et al. 2012). According to the Swiss study by Beretta et al. (2017), avoidable food waste alone releases GHG emissions of 253 kg of carbon dioxide equivalents (CO_2eq) per person per year into the atmosphere. This shows that reducing food waste in private households is an important lever for lowering GHG emissions.

Education is considered to play an important role in achieving climate targets. Reducing household food waste therefore also requires suitable educational approaches. This is where the project **"FoodLabHome – Climate education for reducing household food waste"** (hereafter "FoodLabHome") comes in. The educational programme compiled here addresses food waste as an important but long neglected source of GHG emissions. Young adults investigate the climate impact of food waste in their households by measuring the food waste produced there and determining its climate impact with the help of a Food Waste Tracker. They then develop reduction strategies in order to contribute to climate protection, and share their experiences with the members of their household.

This handbook contains a complete educational programme designed for three project days, with practical phases at home in between. Educators, who in this handbook include teachers, for example, can use the material in formal and non-formal educational settings. It was designed for work with young adults aged about 15 and over and is particularly suitable for students at general secondary schools from grade 10 onwards, vocational school students or first-year university students. It can also be used well with youth groups outside school. Depending on the context and needs, individual parts of the programme can also be used on their own.

All working materials needed to run the project days can be downloaded from the FoodLabHome website and, in their editable version, adapted to your own needs.

Teaching and learning materials for download:

sustainability-education.net/foodlabhome-materials

The modules presented in this handbook were piloted in two rounds at general and vocational secondary schools in the Lüneburg and Berlin areas, so this handbook brings together experience with a range of learning groups. Nevertheless, the project team makes no claim to perfection; there are certainly many other methodological variations and possible improvements.

We welcome feedback, criticism and additions, preferably sent directly to our email address FoodLabHome@leuphana.de.

The FoodLabHome team

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2. The project FoodLabHome

The “FoodLabHome” project developed an innovative and participatory educational approach based on the principles of inquiry-based learning, in which learners themselves become researchers and their households become laboratories. In the educational intervention, the participants investigate the amount, composition and causes of food waste in their own households and analyse its climate impact. In a second step, they develop and test ways of reducing food waste in their household.

The joint project of Leuphana University Lüneburg and Technische Universität Berlin ran for three years (10/2018–9/2021). In the first project year, the educational concept presented in this handbook was developed and piloted. To support the educational intervention, a Food Waste Tracker was developed which can be used, among other things, to determine the climate impact caused by food waste (instructions in chapter 4). Online learning resources were developed as a further element; this handbook refers to them, and to the Food Waste Tracker, at appropriate points. In the final project year, educators were trained in workshops to spread the FoodLabHome project days in a range of educational contexts. To make the educational concept last, this handbook is intended to keep the methods available for climate and consumer education beyond the end of the project.

Food Waste Tracker:

sustainability-education.net/foodlabhome-tracker

Online resources:

sustainability-education.net/foodlabhome-online-module

Materials:

sustainability-education.net/foodlabhome-materials/#bm

The FoodLabHome educational concept at a glance:

- Inquiry-based learning on household food waste: the participants measure food waste in their household, develop individual reduction strategies and test how effective they are for climate protection.
- Three project days, which can also be used in parts
- One or two practical phases for measuring household food waste with an online Food Waste Tracker
- Optional use of online learning resources
- All working materials can be downloaded in editable form

The data basis of this educational concept is the study “Environmental Impacts and Hotspots of Food Losses: Value Chain Analysis of Swiss Food Consumption” (Beretta et al. 2017). It calculates the environmental impacts of food losses using a combined mass and energy flow analysis and life cycle assessment. Beretta et al. (2017) distinguish between 33 food categories (divided into plant products, dairy and egg products, meat and fish products, other products and inseparable items) and between edible and inedible parts of food (corresponding to avoidable and unavoidable food losses). Like Beretta et al., this educational material considers the entire food chain, from agricultural production to the recovery of food losses, and measures and presents GHG emissions as CO2eq (detailed information on the data basis can be found in the factsheet in the supplementary material).

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2.1 The educational approach

As a climate education project, FoodLabHome follows a participatory, experience-based educational approach that encourages action and is based on the principles of inquiry-based learning. The participants themselves become researchers and their households become laboratories. Hofer, Abels and Lembens (2016), drawing on further sources, define inquiry-based learning as follows:

> *"Inquiry-based learning (Forschendes Lernen) refers to a teaching concept in which knowledge, abilities and skills or competences are to be built up, deepened and consolidated in the course of scientific investigations. In addition to working on subject content, inquiry-based learning places great importance on acquiring competences related to experimenting: asking questions, forming hypotheses, planning and carrying out investigations, observing processes, recording observations and results, interpreting results, etc. Through this type of learning, pupils should also experience how the results of investigations can lead to (scientific) knowledge." (Hofer, Abels, Lembens 2016: 4; translated)*

In inquiry-based learning, the participants are thus supported in working through an entire research cycle with increasing independence. As investigations rarely follow an ideal cycle, the participants learn to deal with uncertainty along the way.

Apart from the specific competences mentioned in the definition that can be acquired through inquiry-based learning, this educational approach has three more general learning objectives (Abrams et al. 2008):

- Learning about research
- Learning to do research
- Learning content

In this project, participants learn various relevant content, for example on climate change and GHG, which they then use in the practical phases. In these practical phases, the participants carry out their own research on food waste based on this content. In two reflection phases on project days 2 and 3, they then engage critically with this research experience, through which they also learn, for example, about the validity of knowledge and research in general. This project therefore pursues all three learning objectives of inquiry-based learning.

As described above by Hofer, Abels and Lembens, inquiry-based learning comprises the most important steps of a research process: developing a research question, formulating hypotheses, choosing, preparing and applying suitable research methods, and finally analysing and interpreting the data collected, presenting results and formulating new questions. However, not all of these steps have to be carried out independently by the learners. Depending on how open the research question, the choice of method and the interpretation of results are, four levels can be distinguished: at level 0, everything is specified or carried out by the teacher, while at level 3 everything is worked out by the participants themselves (Table 1).

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Table 1. Levels of inquiry-based learning (Abels & Lembens 2015: 5)

	Question	Choice of method	Interpretation
Level 0: confirmation	by teacher	by teacher	by teacher
Level 1: structured	by teacher	by teacher	by student
Level 2: guided	by teacher	by student	by student
Level 3: open	by student	by student	by student

This handbook uses inquiry-based learning at level 1, i.e. the research question and method are already specified by the handbook and do not have to be developed by the teachers or the participants. However, there is the option of letting participants develop their own research questions as part of this project, to give them an insight into this step of the research process and to encourage their creativity.

The following subsection explains the background of the research questions and methods.

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2.1.1 The research questions and methods: inquiry-based learning and citizen science

The FoodLabHome project is based on the idea of combining the educational approach of inquiry-based learning with the research approach of citizen science. In citizen science, professional scientists cooperate with members of the public in collecting, analysing and/or interpreting research data. Both inquiry-based learning and citizen science thus involve "non-scientists" in carrying out research projects, although with different aims: inquiry-based learning seeks to support learning processes, whereas citizen science aims at research progress in the form of scientific findings. The idea of this project is to pursue both aims at the same time by integrating the two approaches.

Apart from its closeness to inquiry-based learning, citizen science also fits the topic of our educational concept well: because they are difficult to access, food waste in private households has so far hardly been researched (Langen et al. 2015), and it is precisely by involving members of the public through citizen science that the relevant data can be collected. The research questions for this project are therefore:

- How much food waste is produced in private households?
- Why is food waste produced in private households?
- Which reasons for household food waste lead to how much GHG emissions from household food waste?

To answer these research questions, we tested several variants of the educational concept within our project. While we ourselves still worked with paper records to document the measured food waste, we developed the Food Waste Tracker mentioned above for this handbook, i.e. for other people running our project days.

Your opportunity to continue contributing to citizen science

While we are already publishing the data collected when we piloted the educational concept, you can continue to contribute to the citizen science project by running our project days. The Food Waste Tracker offers a corresponding option right at the start. If the data collected anonymously via the Food Waste Tracker are used for further research, the participants' research activities add real value to this field of research. Consent to this and taking part as a contribution to the FoodLabHome project are, of course, voluntary and optional. The educational concept can also be carried out without this.

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2.2 Overview of the project days

The programme developed and piloted here comprises **three project days that build on each other**. Each project day consists of **three modules of about 90 minutes each**, although somewhat different timings may be needed depending on intensity and how much the group likes to discuss. The modules usually contain several units, some of them optional. Many of the units presented here can also be carried out or combined in other ways. If less time is available, many units can also be run **in a shorter form**; suggestions for this are given in the descriptions of the units. Exercises that are not essential for the three project days to run successfully are marked as **"optional"** in the table below (Table 2). Feel free to be creative and bold in varying the programme.

The following module overview (Fig. 1) shows the sequence of the three project days.

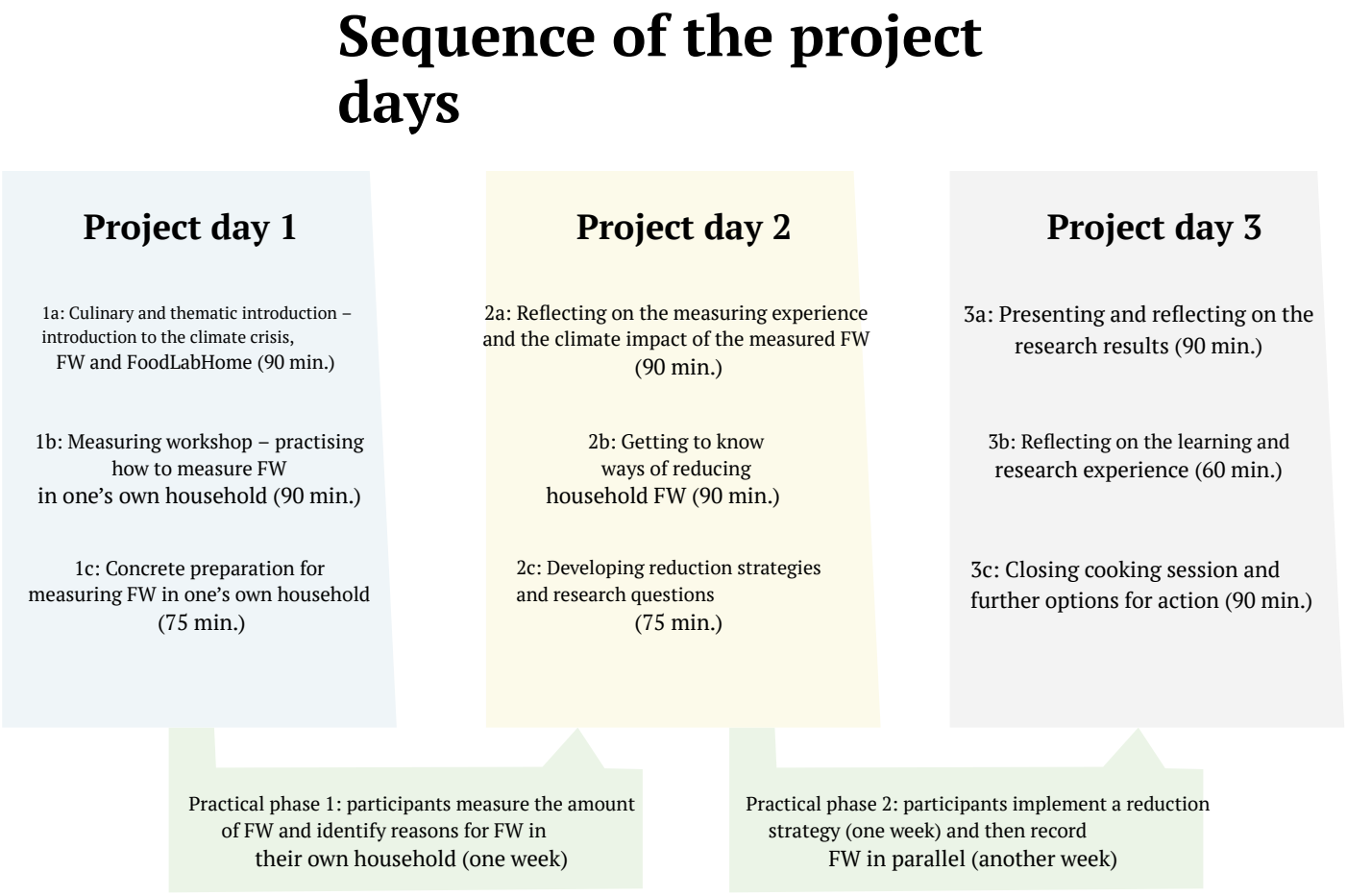


Fig. 1. Module overview for the three project days and the two practical phases

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On the **first project day** (approx. 90 + 90 + 75 min.), participants engage with the **links between the climate crisis and food waste**. After preparing for measuring food waste in a measuring workshop, a **first one-week measuring phase at home** follows, in which the amount, composition and reasons for household food waste are recorded and entered into the Food Waste Tracker. With the help of the calculator, participants can determine the **climate impact** of the food waste in their own household and analyse its composition and causes according to various criteria.

On the **second project day** (approx. 90 + 90 + 75 min.), the group first looks at the measurement results and their climate impact together and then turns to **ways of reducing food waste**. To do so, they consider the composition and amount of the food waste together with the reasons that led to it. The participants derive **individual reduction strategies** for their household and develop a matching **research question of their own**. They apply the reduction strategies in their own household. While continuing to implement the reduction strategy, after at least one week they record their household food waste again in a **second one-week measuring phase**.

At the beginning of the **third project day** (approx. 90 + 60 + 90 min.), the participants present their research processes on individually prepared **research posters**. In this way they document their procedure and compare the results of the two measuring phases. The aim is to find out whether and how household food waste changed after a reduction strategy was introduced, i.e. to what extent the reduction strategies applied **prevent food waste** and make an effective contribution to climate protection. After evaluating the group results and their climate impact together, a **project reflection** follows, in which the participants discuss their learning and research experience and how they perceived the project. The project ends with an outlook on **options for action** beyond one's own household and a **closing cooking session** using leftover food.

If the project days take place in school lessons, the next unit can already be started when a unit finishes during a lesson.

The following figure (Fig. 2) illustrates the research design as it can be implemented in the three project days described here.

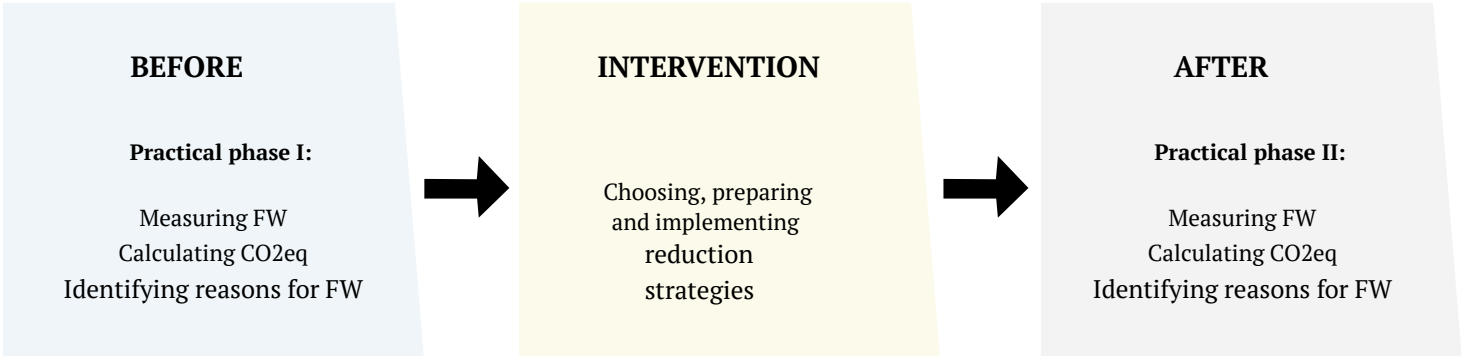


Fig. 2. The research design of the FoodLabHome educational concept

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2.3 Notes on implementation

Before the individual learning units are described in detail in the next chapter, here are some **important notes** on using this handbook.

The educational concept presented here is divided into three project days with three modules each. The **module numbers** reflect the respective project day (1–3). Practice modules for home are planned between the project days. In this handbook the units are listed in chronological order for three consecutive project days, but some of them can also be combined in a different order. The note "Options for further work" gives guidance on other possible sequences.

Teaching and learning materials for download:

sustainability-education.net/foodlabhome-materials

The materials needed (presentations, worksheets, flipchart templates etc.) can be downloaded from the download section of the website. There, all units presented here are listed with a short description and the materials required for download. You will also find various additional supplementary material there that is not assigned to a specific unit but can be used flexibly. It includes a collection of thematically suitable **games** and **feedback methods** that are generally suitable for these project days and can be used as needed.

Online resources:

sustainability-education.net/foodlabhome-online-module

For the participants to carry out the project satisfactorily, **parents/guardians or household members need to be involved**. It is advisable to inform them about the project by letter at an early stage and ask for their cooperation. A **letter template** for this is provided in the supplementary material.

The notes section of the **presentations** lists the content to be conveyed for each slide. To familiarise themselves with the topic, educators are advised to read the **FoodLabHome factsheet for educators** (in the supplementary material). In addition, links to **further information** on food waste are compiled at the end of this handbook, together with a list of other initiatives and educational resources on climate protection and food.

Explainer videos:

sustainability-education.net/foodlabhome-tracker

Detailed instructions for educators on using the Food Waste Tracker can be found in chapter 4 of this handbook. Our explainer videos on the Food Waste Tracker also help participants to use the calculator.

Several units refer to the online learning resources. Each of them is an alternative to the material described in the handbook, with the content prepared in digital form. They do not contain additional content but are methodological variants for teaching it. Participants can work through the online resources on their own at home or, if the equipment is available, use them during the sessions.

(measuring and entering data)

Throughout the project, the participants should collect all worksheets used in a **research folder**. Educators can put together research folders with the necessary sheets in advance and hand them out on the first project day, or ask the participants to set up a folder themselves and file the worksheets as they go.

For the measuring phases at home, all participants need **a set of scales and a measuring container** (bowl). Make sure in advance that all participants have these items. If necessary, educators should offer ways of borrowing scales and measuring containers.

The following overview (Table 2) presents the units according to their key features.

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Table 2. Overview of the units of the three project days

FIRST PROJECT DAY
(255 minutes plus breaks, incl. optional units)

Unit	Didactics/ methods	Download materials	Other materials
Module 1a: Culinary and thematic introduction			
Welcome, agenda and breakfast (30 min.)	Breakfast snacks with input	● Presentation 1 (“Climate crisis, FW, project introduction”) ● Calculation sheet “Breakfast snacks and expected FW” (for educators)	● Name tags (or masking tape & markers) ● Breakfast snacks ● Bowls for waste ● Flipchart or similar with the day’s agenda
Climate crisis and food waste (60 min.)	Input	● Presentation 1 (“Climate crisis, FW, project introduction”) ● Sociometry station posters ● Sociometry distribution of persons (for educators) ● Reason cards (cut out for all participants)	● Computer and projector
Module 1b: Measuring workshop – practising how to measure FW in one’s own household			
Introducing and practising the measuring method (75 min.)	Measuring workshop	● Presentation 2 (“Measuring method: introduction and practice”) ● Food Waste Tracker ● Explainer video on the measuring workshop ● Handout “Instructions for measuring and recording”	● Computer and projector ● Computers/tablets/phones for data entry ● List of materials in the document “Measuring workshop: materials and preparation”
“What would you eat?” (15 min.)	Quiz (optional)	● Presentation 2 (“Measuring method: introduction and practice”)	● Computer and projector ● Red and green cards for each person
Module 1c: Concrete preparation for measuring FW in one’s own household			
Preparing the measurement at home (45 min.)	Input and clarifying questions	● Presentation 3 (“Preparing the measuring phase at home”)	● Computer and projector ● Flipchart for collecting questions ● Research folders (optional) ● Flipchart for task and deadlines (see template) ● If necessary, scales and measuring containers for participants to borrow
Developing a motivation strategy (30 min.)	Individual work (optional)	● Worksheet “Motivation strategy”	

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PRACTICE MODULE 1: FIRST MEASURING PHASE

Unit	Didactics/ methods	Download materials	Other materials
Measuring at home (one week)	Individual work at home	• Printed list with individual IDs for each participant • Handout "Instructions for measuring and recording"	• Scales • Bowl • Computer/tablet/phone • Research folder
"Handling food in the household" (15 min.)	Individual work at home	• Worksheet "Handling food"	

SECOND PROJECT DAY

(255 minutes plus breaks, incl. optional units)

Unit	Didactics/ methods	Download materials	Other materials
Module 2a: Reflecting on the measuring experience and the climate impact of the measured FW			
Welcome and agenda (10 min.)	Input, game		• Name tags (or pens & masking tape) • Flipchart (or similar) with the day's agenda
Silent discussion and exchange on research experiences and findings (60 min.)	Silent discussion, presentation, group discussion	• Research results of the first measuring phase (group results and individual results of all participants)	• 3 large posters (pinboard paper or flipcharts) • Markers for all participants • Computer and projector
Reflecting on the climate impact of the measurement results (20 min.)	Presentation, group discussion	• Research results of the first measuring phase (group results)	
Module 2b: Getting to know ways of reducing household FW			
Getting to know ways of reducing household FW (45 min.)	Station work	• Presentation 4 ("Reduction options, research questions") • 4 heading sheets for tables • 4 task sheets for tables • 4 different info sheets for tables (shopping/attitudes/storage/ cooking and eating habits) (several copies per table) • Worksheets "Handling food" (completed at home)	
Choosing reduction options and developing a research question (45 min.)	Input, individual work	• Presentation 4 ("Reduction options, research questions") • Worksheet "Developing a research question" • Worksheet "Handling food" (completed at home)	• Computer/tablet/phone

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Module 2c: Developing reduction strategies and research questions			
Developing a reduction strategy and adapting the motivation strategy (40 min.)	Individual work (optional)	• Presentation 5 (“Reduction strategies”) • Worksheet “Reduction strategy/ motivation strategy” (double-sided)	
Peer review of the strategies developed (20 min.)	Pair work (optional)	• Presentation 5 (“Reduction strategies”) • Worksheet “Reduction strategy/ motivation strategy” • Worksheet “Peer review” (A5)	
Preparing the second measuring phase (15 min.)	Input, group discussion	• Presentation 5 (“Reduction strategies”)	• Computer and projector • Blank flipchart sheets for all participants • Flipchart for task and deadlines (second measuring phase)

PRACTICE MODULE 2: SECOND MEASURING PHASE

Unit	Didactics/ methods	Download materials	Other materials
Second measuring phase at home and preparing the research posters (one week)	Individual work at home		• Scales • Bowl • Computer/tablet/phone • Research folder • Blank flipchart sheets • Markers

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THIRD PROJECT DAY
(240 minutes plus breaks)

Unit	Didactics/ methods	Download materials	Other materials
Module 3a: Presenting and reflecting on the research results (research posters)			
Welcome and agenda (10 min.)	Input		• Flipchart (or similar) with the day's agenda
Presenting one's own research projects (research posters) (50 min.)	Individual presentations and small-group discussion	• Worksheet "Group conclusion" (same, different and anti-strategies)	• Participants' research posters • Pinboards with pins
Climate impact of individual and group research results (30 min.)	Input, group discussion	• Group research results (both measuring phases)	• Computer and projector
Module 3b: Reflecting on the research experience			
Project reflection (60 min.)	Card query in two small groups	• Handout with in-depth questions (for educators)	• 4 pinboards • Moderation cards • Pins • Markers for all participants
Module 3c: Closing cooking session and further options for action			
Getting to know options for action beyond the household (30 min.)	Small-group exercise (optional)	• Info sheets: "Further options for action"	
Closing cooking session and end of project (60 min.)	Cooking in small groups, eating, final round	• Presentation 6 (recipes) • Recipes as handouts • "Closing cooking session: costing of food and materials" (for educators)	• Computer and projector • Moderation cards • Markers

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If three project days are not possible, we suggest the following sequences for only one or two project days:

Two project days

Agenda for project day 1 (90 min. + 90 min. + 75 min. + breaks)

- Welcome, agenda & breakfast (30 minutes)
- Climate crisis and food waste (60 minutes)
- Measuring workshop – introducing and practising the measuring method (75 minutes)
- Quiz: “What would you eat?” (15 minutes)
- Preparing the measurement at home (45 minutes)
- Developing a motivation strategy (30 minutes)

Agenda for project day 2 (90 min. + 90 min. + 90 min. + breaks)

- Welcome & agenda (10 minutes)
- Silent discussion and exchange on research experiences and findings (60 minutes)
- Reflecting on the climate impact of the measurement results (20 minutes)
- Getting to know ways of reducing household FW (45 minutes)
- Choosing a reduction strategy (without research question, 15 minutes)
- Project reflection (30 minutes, shorter than in the description of the unit)
- Further options for action and closing cooking session (90 minutes)

With only two project days, it is possible to hold one practical phase at home between them. As an alternative to the sequence suggested here with only one simple measuring phase at home, ways of reducing food waste could already be introduced on the first project day, so that the participants carry out a measuring phase at home, then implement a reduction strategy and measure again. However, this requires a first project day with a great deal of content. Depending on the target group, this may be too demanding and also difficult to fit into the time available.



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One project day

Agenda (90 min. + 75 min. + 105 min. + breaks)

- Welcome, agenda & breakfast (30 minutes)
- Climate crisis and food waste (60 minutes, shorter than in the description of the unit)
- Measuring workshop (45 minutes, shortened)
- Reflecting on the climate impact of the measurement results (30 minutes)
- Getting to know ways of reducing household FW (45 minutes)
- Closing cooking session (and short project reflection) (60 minutes, shortened)

With only one project day, the closing cooking session from the end of the third project day can be moved to the beginning instead of the breakfast (before or after the unit "Climate crisis and food waste"). In both sequences, food waste produced at the start of the project day can be used for the measuring workshop.

Depending on the intention and target group, the measuring workshop can also be left out if there is only one project day. The project day is then less practical but can place a stronger focus on climate impact and ways of reducing food waste.

The overviews presented here can be used as **templates for visualising the day's agenda** (flipcharts or similar).

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3. The learning units in detail

All units of the FoodLabHome educational concept are described in detail below, organised by module.

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MODULE 1A: Culinary and thematic introduction

Module 1a introduces the FoodLabHome project with a welcome, information about the project and a shared breakfast. A subsequent input with interactive elements works out the climate impact of food waste and the role of households in preventing it.

Unit 1a I: Welcome, agenda and breakfast

GOAL:

Participants know the idea of the project.

DURATION:

30 minutes (without name game)

FORMAT:

Input with breakfast

MATERIALS:

If needed, name tags (or masking tape and markers), breakfast snacks and bowls for waste, flipchart with the day's agenda, calculation sheet "Breakfast snacks and expected FW"

SUITABLE FOR:

Introductory activity for the first project day, without going into depth

ROOM ARRANGEMENT:

Semi-open circle of chairs or group tables

LINK:

sustainability-education.net/foodlabhome-materials/#m1a-e1

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PREPARATION:

The educators provide breakfast snacks and containers for collecting food waste. The flipchart with the agenda is put up.

PROCEDURE:

The participants arrive, help themselves to breakfast snacks and take a seat. The educators welcome the participants, introduce themselves if necessary and point out the breakfast snacks, which may be eaten during this unit. The educators then briefly present the idea of the project and the agenda of the project day on a flipchart.

Materials:

sustainability-education.net/foodlabhome-materials/#bm

VARIATIONS:

- If the group members do not know each other yet, the participants receive personal name tags or make them themselves with masking tape and markers. In this case, a getting-to-know-you game can be added to the introduction, for example the game "Fruit salad" (instructions under "Energiser games" in the supplementary material). A positioning exercise in which the participants position themselves in the room between two poles in response to certain opening questions also works well as an introduction. For example, participants can be asked to position themselves in relation to the statements "I have already dealt a lot/little with the topic of food waste" and "I have already dealt a lot/little with the topic of climate change." The educators then ask individual participants to share their previous experiences with the group.
- If there is only one project day, you could start with cooking together instead of the breakfast. The food waste produced can then be used to practise measuring in the measuring workshop.

TIP FOR EDUCATORS:

Depending on the scope of the project as a whole, the idea of the project, the procedure and the agenda can be presented briefly at the beginning. With three project days, however, we recommend giving this input only after the thematic introduction. It can then build on the content of the presentation "Climate crisis and FW", which makes it easier to follow and allows more detail.



Fig. 3. Leftovers from the welcome breakfast (photo: FoodLabHome)

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Unit 1a II: Climate crisis and food waste

GOAL:

Participants recognise and reflect on the climate impact of food waste and the reasons for it, particularly in the context of private households. They assess the role of households in preventing food waste.

DURATION:

60 minutes

FORMAT:

Input with interactive elements (positioning exercises)

MATERIALS:

Computer and projector, presentation 1 ("Climate crisis, FW, project introduction"), sociometry posters, sociometry distribution of persons (for educators), 14 or 19 reason cards (cut out)

SUITABLE FOR:

Thematic introduction to the climate impact of food waste on the first project day

ROOM ARRANGEMENT:

Semi-open circle of chairs or group tables (space in the room needed for positioning exercises)

LINK:

sustainability-education.net/foodlabhome-materials/#m1a-e2

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

SUMMARY:

Using a presentation, the participants learn which reasons most often lead to food waste, what options there are for recovering food and how climate-relevant different foods are. Three short videos introduce them to basic connections between climate change and food waste, which they then discuss. Through sociometric positioning exercises in the room, they explore food waste and GHG along the food chain (from agriculture to end consumers).

PREPARATION:

The educators prepare the presentation and have the posters and reason cards ready.

Online options on food waste and the climate crisis:

sustainability-education.net/foodlabhome-online-module/ #climate-crisis

PROCEDURE:

Introduction: climate crisis and food (video, discussion):

The educators show the six-minute video on Fridays for Future, climate change and its consequences and open a conversation about how the climate crisis and climate protection are perceived. They then raise the question: what does food have to do with the climate crisis? After a short exchange on this question, the educators show the video (excerpt: 1:05–2:04) on carbon dioxide (CO2), GHG and the greenhouse effect.

GHG IN THE FOOD CHAIN (POSITIONING EXERCISE, PRESENTATION):

This is followed by a positioning exercise on the food chain based on the question: at which stages, through which processes, how much GHG is produced? The participants are asked to assign themselves to the six stages in what they consider the correct proportion of GHG. Once all participants have found their position, they summarise the result of the exercise. There is a short exchange on the reasons for their positions, after which the educators reveal the actual proportions. The participants return to their seats. Using the presentation, the educators explain which processes produce GHG at the individual stages. An overview for educators of how to distribute people depending on group size can be found in the document “Sociometry distribution of persons”.

The educators then give an input on the GHG of different food categories. It becomes clear that the highest GHG emissions are caused by meat and fish products.

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FW IN THE FOOD CHAIN (VIDEO, POSITIONING EXERCISE, PRESENTATION):

Next, the topic of waste is addressed, again introduced by a short video (trailer of the film "Taste the Waste", 15 seconds). In a second positioning exercise, the participants are again asked to assign themselves to the stages of the food chain already known to them in what they consider the correct proportion, this time based on the question: where is how much food waste produced? Once all participants have found their position, they summarise the result, briefly explain their positions, and the educators then reveal the actual distribution of food waste along the food chain. Using the presentation, options for recovering food waste are then shown. The educators also use the presentation to explain which processes produce waste at the individual stages of the food chain.

REASONS FOR HOUSEHOLD FW (EXERCISE):

After working out the reasons for food waste along the food chain, the group looks at the specific reasons for food waste in the household. The 14 reason cards are handed out to the group (one card per person; for large groups, print twice so that two participants get the same card), and the participants are asked to form a small group with others holding cards on related topics. They can use the five reason categories shown on the slide as a guide or work out the category themselves. Six groups should be formed according to the reason categories. The participants then read out their cards one after the other and name the overarching reason category (storage, shopping etc.). Depending on the number of people and the level of difficulty, the cards with the overarching reason categories can also be handed out. There are then 19 reason cards in total and still six groups.

STATE OF RESEARCH ON THE CLIMATE IMPACT OF FW AND CITIZEN SCIENCE (INPUT):

The summary overview of GHG and food waste along the food chain highlights the particular importance of households, which have the highest climate impact and produce the most food waste.

Finally, studies on food waste are presented and it is explained why the climate impact of food waste is a research gap. The educational approach of inquiry-based learning, possibly the citizen science approach, and the FoodLabHome idea connected with these approaches are then explained.

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VARIATIONS:

- Instead of the presentation and the exercises, the online module with videos, animations and texts can be used for the thematic introduction.
- Depending on the time available, the exercise on the reasons for food waste can be left out. Instead, the reason cards can be handed out and read aloud by the participants.
- Depending on the focus of the project, the target group, the length of the project days and the involvement of scientific partners, decide whether this input on citizen science is necessary and enriching or unsuitable or too demanding, in which case it can be left out.

Materials:

sustainability-education.net/foodlabhome-materials/#bm

FURTHER READING:

FoodLabHome factsheet for educators (in the supplementary material). A compilation of the most important content on the climate impact of household food waste for running the project, with background information on the data basis, among other things. The FAQ also offers some background information.

WWF Deutschland (2015): Das große Wegschmeißen – Vom Acker bis zum Verbraucher. Ausmaß und Umwelteffekte der Lebensmittelverschwendung in Deutschland. Berlin. Study (in German) on food waste along the global value chain, prevention potential and the climate impact of food losses. www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/WWF_Studie_Das_grosse_Wegschmeissen.pdf (accessed: 24.06.2020)

In addition, the German campaign **"Zu gut für die Tonne"** (Too good for the bin) offers extensive information on food waste: www.zugutfuerdietonne.de/hintergrund (accessed: 24.06.2020)

OPTIONS FOR FURTHER WORK:

Conclusion of unit 1a I (if not already done at the beginning): presenting the project idea, project procedure and agenda

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MODULE 1B: Measuring workshop – practising how to measure FW in one's own household

The units of module 1b introduce how food waste is recorded and, building on this, prepare participants for measuring food waste at home. As an introduction to the measuring workshop, the quiz "What would you eat?" offers a light-hearted option that clearly shows cultural and individual differences in judging food as waste. As additional preparation for the measuring phase, participants can be guided to develop a motivation strategy for the members of their household who are to take part in the measurements.

Unit 1b I: Introducing and practising the measuring method

GOAL:

Participants can measure food waste and enter the results into the Food Waste Tracker. They understand how the climate impact is calculated.

DURATION:

75 minutes

FORMAT:

Input, measuring workshop

MATERIALS:

Computer and projector, presentation 2 ("Measuring method: introduction and practice"), computers/phones/tablets for each small group for data entry, complete measuring workshop materials (detailed list with quantities in the document "Measuring workshop: materials and preparation"), handout "Instructions for measuring and recording"

SUITABLE FOR:

Deepening the content, interaction, possibly preparing the measuring phase at home (first project day)

ROOM ARRANGEMENT:

Group tables

LINK:

sustainability-education.net/foodlabhome-materials/#m1b-e1

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SUMMARY:

In an input, the participants learn which data are needed for the research objective. The educators explain the measuring procedure, and the participants then measure and document sample food waste in a small-group exercise.

PREPARATION:

The educators provide all necessary materials for each group table (Fig. 4).

PROCEDURE:

Using presentation 2, the educators first explain which food waste the participants are to record during the measuring phase at home. Two participants read out the slide “Measuring food waste”. Depending on the time available, the quiz “What would you eat?” can be carried out at this point as an exercise on defining food waste. The educators then present the procedure: the participants record the amounts of food waste per food category together with the reasons; based on this, the Food Waste Tracker calculates the GHG emissions caused by this food waste, and the participants can then develop reduction strategies. Food waste is to be documented every time it occurs in the household. Measuring and entering data into the Food Waste Tracker is then demonstrated step by step using the explainer video and afterwards carried out by the participants themselves.

Small-group exercise: in a short measuring workshop, measuring and data entry are practised with four examples of food waste. The educators first explain that on each group table there are numbered bowls with sample food waste, which are to be measured and recorded one after the other. Leftovers from the breakfast or from cooking together can be added to these samples. To enter the reasons, the participants use the text excerpts, each of which tells in one sentence how the food waste came about. From this, the participants derive the reason for the food waste and enter it into the calculator. The educators explain that on each group table there is a login link for this exercise for each small group, as well as the handout “Instructions for measuring and recording”, which describes the procedure step by step.

The educators ask the participants to get the scales, measuring container and gloves ready and to put on disposable gloves for measuring if needed. Before measuring, the measuring container (bowl) is placed on the scales and the “TARE” button is pressed so that the scales show “0 grams”. In this way, the scales show only the weight of the contents of the bowl.

Before measuring, stones, bones and inedible peels are removed, as these are not to be measured. The educators make clear that the food waste is now to be measured separately by category, rounded to the nearest gram, and entered. As soon as an item of food waste has been completely weighed, it is disposed of in the bin bags provided.

The Food Waste Tracker evaluates the data entered.

At the end of the educators’ introduction, the groups are formed (2–4 participants per group) and the small-group exercise begins.

Explainer videos:

sustainability-education.net/foodlabhome-tracker

(measuring and entering data)

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TIPS FOR EDUCATORS:

To measure real food waste, the waste from the welcome breakfast or from cooking can be used (Fig. 3). Food waste from the classroom, the canteen or the teaching kitchen (if available) can also be collected separately the day before in a bin set up specially for the project day and then measured in this unit. Make sure that the choice of sample food waste allows participants to practise handling different types of food waste (see “Measuring workshop: materials and preparation”).



Fig. 4. A measuring workshop group table (photo: FoodLabHome)

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Unit 1b II: Quiz “What would you eat?”

GOAL:

Participants name the definition of food waste used. They recognise individual and cultural differences in judging food as waste. They distinguish which food waste is (not) to be recorded in FoodLabHome.

DURATION:

15 minutes

FORMAT:

Input, group exercise (quiz)

MATERIALS:

Computer and projector, presentation 2 (“Measuring method: introduction and practice”), red and blue cards for each person

SUITABLE FOR:

Preparing to measure food waste, interaction & energiser

ROOM ARRANGEMENT:

Semi-open circle of chairs or group tables

LINK:

sustainability-education.net/foodlabhome-materials/#m1b-e2

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

SUMMARY:

The educators present the project's definition of food waste. This is followed by a quiz in which the participants hold up a blue or red card to indicate whether they would eat (blue card) or throw away (red card) certain parts of food. Afterwards, ways of using the various parts of food are presented, and it is explained which parts of the waste are included in the measurement.

PREPARATION:

The educators prepare the presentation and hand out one red and one blue card to each person.

PROCEDURE:

Using the presentation, the educators introduce the project's definition of food waste and start the quiz. They explain that parts of food will now be shown and that the participants should indicate whether they consider them edible by holding up the corresponding card. Blue cards stand for "Yes, I would eat it". Red cards stand for "No, I would throw it away or use it in another way (e.g. as animal feed)". A carrot with its parts peel, carrot greens and lower tip is shown, and each part is asked about individually. This is followed by the information that all parts are edible. Next comes a picture of an apple with peel and core, a query about its parts and then information on what is edible. Following the project's definition, it is made clear that the apple core is unavoidable food waste and is not to be measured. Opinions may differ here, which can be used to show why a clear definition is so important. Then a picture of a roast chicken (meat, bones, skin) is shown and the participants are asked again, followed by information on which parts are edible. It is emphasised that bones are unavoidable food waste and are not to be measured. Any discussions about the edibility of the foods shown should be moderated by the educators and ultimately lead to shared definitions, as these will be the basis for the following food waste measurements.

Finally, the educators sum up that there are very different views on whether parts of food are edible or not, and that these views differ greatly between cultures, families and individuals.

Online option for the quiz:

sustainability-education.net/foodlabhome-online-module/#basics

VARIATIONS:

- The quiz can be shortened to fewer examples if time is short.
- The participants can also do the quiz individually online.

TIPS FOR EDUCATORS:

- It is advisable to embed the quiz in the introduction to the measuring workshop (see the order of the slides in presentation 2).

OPTIONS FOR FURTHER WORK:

Continuation of unit 1b I: "Introducing and practising the measuring method"

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MODULE 1C: Concrete preparation for measuring FW in one's own household

Module 1c prepares the participants specifically for measuring food waste in their own household. As optional preparation for the measuring phase, participants can be guided to develop a motivation strategy for the members of their household who are to take part in the measurements.

Unit 1c I: Preparing the measurement at home

GOAL:

Participants explain the project idea and name the requirements for scientific work in the FoodLabHome project.

DURATION:

45 minutes

FORMAT:

Input and clarifying questions

MATERIALS:

Computer and projector, presentation 3 ("Preparing the measuring phase at home"), flipchart for collecting questions/difficulties, research folders for all participants (optional), list of personal IDs for all participants to access the Food Waste Tracker (so that entries can be saved), flipchart for task and deadlines (based on the template), worksheet "Handling food in the household" (copies for all participants), handout "Instructions for measuring and recording" (copies for all participants)

SUITABLE FOR:

Concrete preparation for the first measuring phase at home, if another project day is planned

ROOM ARRANGEMENT:

Semi-open circle of chairs or group tables

LINK:

sustainability-education.net/foodlabhome-materials/#m1c-e1

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SUMMARY:

The educators hand out all materials for the measuring phase at home. Open questions and difficulties are discussed. The educators present the project procedure again and explain why honest measuring and data entry are essential. They sum up the task for the measuring phase.

PREPARATION:

The educators put together research folders with the worksheets needed for the measuring phase at home for all participants and have them ready to hand out. The educators create a login for the Food Waste Tracker in the role of project leader. In the "Create project" section, they print out a list of personal IDs for all participants (detailed information on using the Food Waste Tracker can be found in the description of the FoodLabHome online resources in chapter 4). A flipchart for collecting questions and difficulties is prepared. The presentation is set up.

PROCEDURE:

Using the presentation, the educators explain that the measuring phase at home will now be prepared in more detail. The measuring phase at home is intended to find out how much avoidable GHG emissions are caused by food waste at home. Using the planned project procedure, the educators make clear what role the measuring phase at home will play. They point out that the group's measurement results will be presented at the beginning of the second project day. For this, participants should bring a printout of their personal measurement data. If they have no access to a printer, they can bring their results on their phone.

The educators hand out the handout "Instructions for measuring and recording" and one of the printed IDs to each person. Each ID automatically comes with a link, which can also be opened via a QR code. The participants use this link to access their personal area of the calculator. This is the only way their entries can be saved over several days.

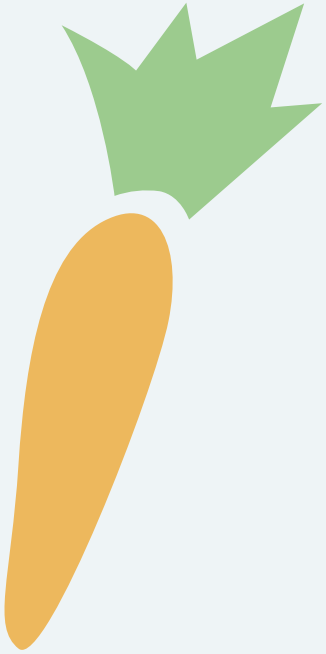
The educators then open the floor for questions or for sharing difficulties that came up during the measuring workshop. The participants are first given the opportunity to answer each other's questions. If necessary, the educators give hints or offer solutions. In this conversation, the educators also check whether the procedure described in the measuring workshop was understood and followed (e.g. whether stones were removed).

This is followed by an explanation of why honest data entry matters. The educators make clear that the first measuring phase will be followed by the development of a reduction strategy and then a second measuring phase, which will finally show whether the amount of food waste has changed. This requires honest data entry in both measuring phases. The educators explain how data can become distorted and why this should be avoided. It is pointed out that the data are treated anonymously and are not graded.

The educators ask the participants to inform the members of their household about the shared task. The scales and measuring container should be set up in the kitchen, and weighing and data entry should be practised with the household members. Household members should measure even when the participants are not present. The request to take part can be justified by referring to the participants' own scientific work in the project and to the contribution to climate protection.

Finally, if available, the scales and measuring containers that the participants can use during the project are handed out. In addition, the worksheet "Handling food" is distributed, which the participants should fill in together with the members of their household before the next project day and bring along. The educators sum up the task once more on a flipchart and also state the deadlines for the measuring phase (start and end).

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VARIATIONS:

- This unit before the measuring phase can be supplemented by noting down assumptions. The participants are asked to write down which reasons or food categories they expect to occur most often. These assumptions can then be reflected on during the second project day.

- Visualising the rather detailed instructions for the measuring phase (especially the dates and periods of the measurements at home) has proved very useful. Flipcharts bring variety into the room and allow the information to remain visible throughout the measuring phase.

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Unit 1c II: Developing a motivation strategy

GOAL:

Participants plan how they will motivate the members of their household to take part.

DURATION:

25 minutes

FORMAT:

Individual exercise

MATERIALS:

Worksheet “Motivation strategy” for all participants

SUITABLE FOR:

In-depth preparation for the first practical phase at home, if more than one project day is planned

ROOM ARRANGEMENT:

Group tables

LINK:

sustainability-education.net/foodlabhome-materials/#m1c-e2

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

SUMMARY:

The participants fill in the worksheet “Motivation strategy”. The educators support them as needed.

PROCEDURE:

After the importance of correct data entry has been emphasised in preparing the measuring phase at home, the educators ask the participants to think about how they can get the members of their household to take part (optionally with the help of presentation 3). To do so, they fill in the worksheet “Motivation strategy”. The educators walk around and help the participants develop their individual motivation strategy.

TIPS FOR EDUCATORS:

- Developing a motivation strategy is not structurally necessary for the project, but thinking about it in advance can make it easier for the participants to work with the members of their household.
- The motivation strategy is best developed after the explanations on correct data entry and before the task is summed up at the end of the first project day.

OPTIONS FOR FURTHER WORK:

Conclusion of unit 1c I: “Preparing the measurement at home”

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PRACTICE MODULE 1: FIRST MEASURING PHASE

In practice module 1, the participants measure their food waste at home during an agreed measuring phase and enter it, together with the reasons for it, into the Food Waste Tracker. In addition, they use a worksheet to look at how food is handled in their household.

Unit 1 I: First measuring phase at home

GOAL:

Participants record the amount of and reasons for food waste in their own household during the agreed period.

DURATION:

One week

FORMAT:

Measuring phase at home

MATERIALS:

Scales, bowl, computer/tablet/phone, research folder with worksheets and handouts, personal ID link to the Food Waste Tracker (so that entries can be saved)

SUITABLE FOR:

Practical activity in one's own household, if another project day is planned

LINK:

sustainability-education.net/foodlabhome-materials/#pp1

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PROCEDURE:

The participants measure the amount of food waste (Fig. 5) in their household during the agreed period and enter all the required data (food category, amounts of food waste and reasons for food waste) into the Food Waste Tracker. They bring their personal measurement data (overall evaluation) to the next project day as a printout or as a screenshot on their phone/tablet/laptop.

TIPS FOR EDUCATORS:

It is a good idea to offer participants a way of contacting you during the measuring phase so that questions can also be answered between the project days (by email, chat, online learning platform, ...).

OPTIONS FOR FURTHER WORK:

In parallel with the first measuring phase: unit II: worksheet “Handling food in the household”

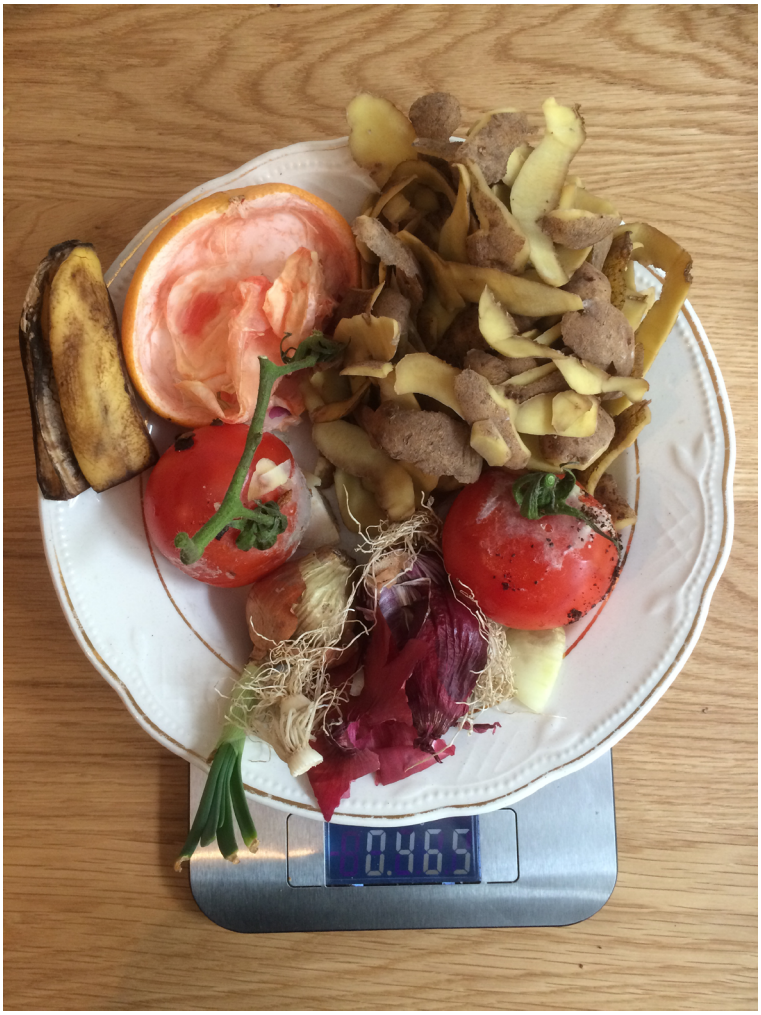


Fig. 5. Weighing food waste (photo: FoodLabHome)

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Unit 1 II: Worksheet “Handling food in the household”

GOAL:

Participants analyse how food is handled in their household.

DURATION:

15 minutes

FORMAT:

Individual work (at home)

MATERIALS:

Worksheet “Handling food” for all participants

SUITABLE FOR:

Accompanying in-depth work during the first measuring phase, preparing for the second project day

LINK:

sustainability-education.net/foodlabhome-materials/#pp1-e2

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PREPARATION:

The worksheets are handed out to all participants at the end of the first project day.

PROCEDURE:

During the measuring phase at home, the participants fill in the worksheet “Handling food”.

VARIATIONS:

- The worksheet can also be handed out after the measuring phase but before the second project day.
- Optionally, the participants can already work on the first page of the worksheet “Developing a research question” from module 2 at home after the first measuring phase. In doing so, they get an overview of the amounts of food waste and GHG produced and which reasons occurred most often.

TIP FOR EDUCATORS:

Handing out this worksheet later makes sense if time runs short at the end of the first project day, or to avoid confusion if the participants can take in little more at the end of the first day. Having the teacher hand it out later can also help to remind participants of the topic and keep it present. Working on it only after the first measuring phase can also prevent it from influencing the first measurements.

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MODULE 2A: Reflecting on the measuring experience and the climate impact of the measured FW

In module 2a, the participants are first welcomed to the second project day. They then exchange views on their research experiences and findings using the "silent discussion" method. Afterwards, the educators present the climate impact of the measurement results, which are then discussed in the group.

Unit 2a I: Welcome and agenda

GOAL:

Participants know the project procedure so far and the agenda for the second project day.

DURATION:

10 minutes

FORMAT:

Input, energiser game

MATERIALS:

If needed, name tags (or pens and masking tape), flipchart with the day's agenda, if needed instructions "Energiser games"

SUITABLE FOR:

Start of the second project day, interaction, without going into content

ROOM ARRANGEMENT:

Semi-open circle of chairs

LINK:

sustainability-education.net/foodlabhome-materials/#m2a-e1

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

PREPARATION:

If needed, name tags (or pens and masking tape) are laid out, the day's agenda is put up and a circle of chairs is formed.

PROCEDURE:

The educators welcome the participants to the second project day. They lead a short energiser game (e.g. food bingo, instructions under "Energiser games" in the supplementary material) and sum up the project so far, with the first project day and the measuring phase at home. They then present the agenda for the day.

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Unit 2a II: Silent discussion and exchange on research experiences and findings

GOAL:

Participants reflect on and discuss their research experiences and findings from the first measuring phase.

DURATION:

60 minutes

FORMAT:

Group exercise “silent discussion”, input, group discussion

MATERIALS:

Three large posters (pinboard paper or flipcharts), markers for all participants, individual results of the first measuring phase (for each participant), computer and projector, group results of the first measuring phase (visible in the evaluation view of the Food Waste Tracker; detailed information on using the Food Waste Tracker in chapter 4 of the handbook)

SUITABLE FOR:

Individual reflection on the measuring experience and exchange among participants on the second project day

ROOM ARRANGEMENT:

Three group tables (or three pinboards)

LINK:

sustainability-education.net/foodlabhome-materials/#m2a-e2

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

SUMMARY:

The educators explain the silent discussion method. The participants then go individually from poster to poster and write down their contributions on the three topics (research method, amount of food waste and reasons for food waste) based on given questions. The posters are then discussed in the group.

PREPARATION:

The posters are laid out on group tables or pinned to pinboards. The topics for discussion and the corresponding reflection questions are written on the posters and/or shown on a presentation slide. Markers are laid out for all participants. The presentation is prepared for showing the measurement results.

PROCEDURE:

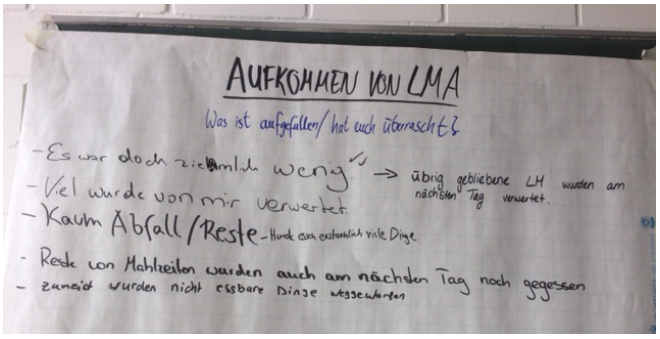
The educators explain that the participants will now reflect on and exchange their research experiences and findings. For 30 minutes, they write down their contributions to the questions on the three topics (research method, amount of food waste and reasons for food waste). Participants may respond to each other in writing but should not talk. If necessary, they can look at their own measurement results again to formulate their contributions. The educators explain that the silent discussion will be followed by a group discussion. The following questions work well for the silent discussion:

Amount of FW: What did you notice? What surprised you?

Reasons for FW: Which reasons for food waste did you identify? What did you notice? What surprised you?

Measuring method: Did you record everything? Were there any difficulties? Was the measurement accurate?

This is followed by a group discussion of the three posters. The meaningfulness of the measuring method is discussed using the questions on the corresponding poster. The contributions on the amount of food waste (Fig. 6) and the reasons for it (Fig. 7) are discussed and compared with the assumptions made beforehand.



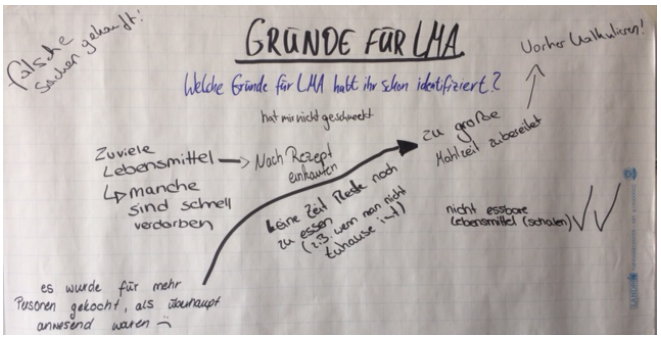


Fig. 6 and 7. Posters from the silent discussion (photos: FoodLabHome)

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

Unit 2a III: Reflecting on the climate impact of the measurement results

GOAL:

Participants recap the climate impact of food waste. They assess the climate impact of their own food waste and that of the whole group. They analyse which reasons for food waste led to particularly high GHG emissions.

DURATION:

20 minutes

FORMAT:

Input, group discussion

MATERIALS:

Computer and projector, group results of the first measuring phase (present online if possible; detailed information on using the Food Waste Tracker in chapter 4 of the handbook), presentation 1 (optional)

SUITABLE FOR:

Processing the content of the first measuring phase on the second project day

ROOM ARRANGEMENT:

Semi-open circle of chairs

LINK:

sustainability-education.net/foodlabhome-materials/#m2a-e3

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

SUMMARY:

The educators present the results on the amount and climate impact of the measured food waste. They use the sorting function to show the results by food category and reason for food waste, which the participants then interpret together as a whole group.

PREPARATION:

The educators prepare the evaluation of the group results. To do so, the group results of the first measuring phase are opened in the evaluation view of the Food Waste Tracker. Depending on what you want to evaluate, the sorting function can be used with different criteria. The evaluation function of the Food Waste Tracker is explained in detail in chapter 4.

To introduce the unit, the graphic on GHG and food waste along the food chain from presentation 1 can be used again.

PROCEDURE:

Using the familiar graphic of the food chain, the educators remind the participants of the content on the climate impact of food waste discussed in the first module (presentation 1). The educators then present the results calculated with the Food Waste Tracker on the climate impact of the food waste measured by the whole group in the first measuring phase. They illustrate the climate impact with everyday comparisons, i.e. they explain that the climate impact of the food waste corresponds, for example, to a certain number of hours an LED lamp can burn or a certain number of cups of tea that can be boiled. In addition, the amounts of food waste and the climate impact are sorted by food category, so that the group can work out which foods were thrown away in large quantities and which food categories had a particularly high climate impact. The reasons for the food waste can also be evaluated and sorted by various categories. This makes it possible, for example, to work out which reasons led to particularly high GHG emissions.

The results are discussed in open reflection rounds.

VARIATIONS:

- When comparing the data collected with LED hours and cups of tea, the educators can first ask the participants how many hours or cups they expect before showing the results. Likewise, before presenting the results on food categories and reasons for food waste, the educators can ask for the participants' assumptions.

- If the project focuses on scientific research, the group's results on the amounts and climate impact of food waste can be compared with those of other studies from presentation 1 (first project day), so that the participants can place their measurement results in the context of the state of research.

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TIPS FOR EDUCATORS:

- Looking at the climate impact and the amounts of food waste by food category at the same time shows that certain foods have a particularly high climate impact (above all meat, cocoa, coffee and tea). Even if comparatively small amounts were wasted in these categories, the climate impact of these amounts is probably still higher than in most other food categories.
- This unit is intended to motivate the participants to reduce food waste in their household. When evaluating the results, the educators should therefore try to make clear to the participants that the aim of the second measuring phase is to reduce the amount of food waste. The following module 2b offers concrete support for this.
- To be able to compare the first and second measuring phases later, the group results should be saved after the first measuring phase ("print"). This allows the two measuring phases to be looked at separately later on. Although the first measuring phase can still be accessed later using the date function in the evaluation window, saving or printing before the second measuring phase is recommended for a direct visual comparison of the periods.

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MODULE 2B: Getting to know ways of reducing household FW

In module 2b, the participants first get to know ways of reducing household food waste through station work in small groups. If a further practical phase at home is planned, this can be followed by individual work in which participants choose reduction options that suit them and develop a research question.

Unit 2b I: Getting to know ways of reducing household FW

GOAL:

Participants present various ways of reducing food waste. They analyse to what extent they apply them in their own household.

DURATION:

45 minutes

FORMAT:

Small-group exercise (station work)

MATERIALS:

Presentation 4 (“Reduction options, research questions”), 4 heading sheets for tables, 4 task sheets for tables, 4 different info sheets for tables (shopping/attitudes/storage/ cooking and eating habits) (several copies per table, at least one sheet for every two participants), worksheets “Handling food” completed at home, gong (as a signal to change tables)

SUITABLE FOR:

Thematic introduction to ways of reducing food waste, interaction

ROOM ARRANGEMENT:

4 group tables

LINK:

sustainability-education.net/ foodlabhome-materials/#m2b-e1

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

SUMMARY:

At the station tables, the participants work on various ways of reducing food waste in four small groups. After four work phases, they bring together the reduction options they have worked out in the whole group.

PREPARATION:

The tables are put together to form group tables. Each table is given a heading sheet, a task sheet and an info sheet. The presentation is prepared.

PROCEDURE:

The educators begin the unit by explaining where the group currently stands in the research process, i.e. they make clear that the phase is now beginning in which ways of reducing food waste and reduction strategies are developed, which will then be tried out at home in the second measuring phase.

The educators explain how the station work runs: the participants move from table to table in small groups and collect information on the various topics. The tables deal with reduction options in the areas of attitudes, shopping, cooking and eating habits, and storage. These topics are based on the reasons for food waste already familiar from the measuring phase.

The participants are asked first to read the information laid out at the stations and then to work on the questions listed there (Fig. 8). So the participants first read on their own and then discuss the questions on the reduction options in their small group. After about 10 minutes, at the sound of a gong, the small groups move to the next table together and work on the next topic, so that by the end all participants have been to every table once. The participants are asked to take their research folders, the worksheet “Handling food” completed at home and a pen from table to table. The folders can help them answer the questions on the reduction options with their own data.

Depending on the size of the group, the participants are asked at the beginning to form small groups of a certain size themselves (at least two and at most five people).

During the station work, the educators go from table to table and support the participants with the tasks.

To conclude the station work, the participants can read out once more all the reduction options they have got to know at the station tables, using presentation 4.

Online option on reduction options:

sustainability-education.net/foodlabhome-online-module/ #reduction

VARIATIONS:

- Alternatively, the online module on ways of reducing food waste can be used for this unit.
- For a large group, each station table can be set up twice, so that a total of 8 groups can work on stations at the same time.

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TIPS FOR EDUCATORS:

- When introducing the exercise, the illustration of the table layout in presentation 4 (“Reduction options, research questions”) can be used to help participants find their way. The tables should then be positioned in the room in the order shown on the slide. The colour coding of the tables can also be adapted accordingly by writing the tasks on cards of the corresponding colour.
- Make sure that the small groups move from table to table in the same order (e.g. clockwise). Otherwise, several groups may end up not having visited the same table.

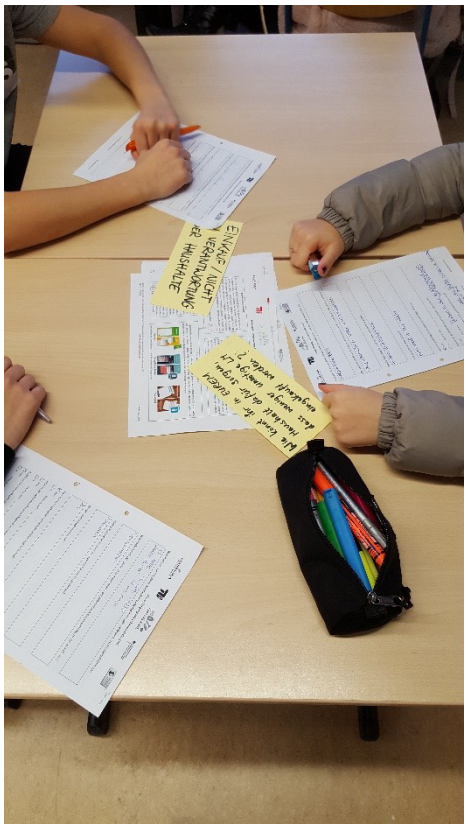


Fig. 8. Station tables on ways of reducing household food waste (photo: FoodLabHome)

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Unit 2b II: Choosing reduction options and developing a research question

GOAL:

Participants transfer the reduction options they have worked out to their household and develop their own research question based on their measurement results.

DURATION:

45 minutes

FORMAT:

Input, individual work

MATERIALS:

Presentation 4 (“Reduction options, research questions”), worksheet “Developing a research question” for all participants, worksheet “Handling food” (already completed at home by participants), computer/tablet/phone

SUITABLE FOR:

Guided individual in-depth work to prepare for the following practical phase in the household

ROOM ARRANGEMENT:

Circle of chairs or group tables

LINK:

sustainability-education.net/foodlabhome-materials/#m2b-e2

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SUMMARY:

Using the worksheet “Developing a research question”, the participants analyse their measurement results and compare the ways of reducing food waste they got to know in the station work with how food is handled in their household. They choose reduction options that suit them and, working individually, develop a research question that fits the project framework.

PREPARATION:

Presentation 4 is prepared and the worksheets “Developing a research question” are laid out.

PROCEDURE:

Using the project diagram, the educators show that the next step is to choose and prepare a reduction strategy, whose effectiveness will then be tested in the second measuring phase. It is explained that the measurement data from the two phases will then be compared to find out how applying a reduction strategy can reduce the amount of food waste.

Using several fictitious examples (see presentation 4), the educators now show how a research question can be developed. This involves looking at the amount of food waste in the various food categories, the reasons given for food waste and the reduction options. Using the sorting function in the evaluation view of the Food Waste Tracker, the educators show the participants that they can sort the food categories and the reasons given by the amount of GHG emissions caused. In this way, participants can determine for their household which food waste or which reasons caused the highest GHG emissions. They can then choose a suitable reduction option for this and develop a research question.

The participants now proceed step by step using the worksheet “Developing a research question”. First, on the first page, they note which food categories produced the most food waste and which food categories caused the highest GHG emissions.

They do the same with the reasons, noting which reasons caused the largest amount of food waste and the highest GHG emissions.

In the second phase, the participants then go through the reduction strategies and tick to what extent they fit the data they have determined for their household. They then develop their research question, which takes up the particularly relevant food categories and reasons and links them with a suitable reduction strategy.

Meanwhile, the educators walk around and support the participants in this individual work.

If participants have measured particularly small amounts of food waste, some of them can also pursue an anti-reduction strategy (see example 4 of the research questions in presentation 4). For this, research questions are developed in which a practice that has so far saved food waste is dropped (e.g. no longer checking stocks before shopping). The resulting change in the amount of food waste can be used to investigate how effective reduction options already in use are. Depending on the target group, decide whether this option might be too demanding and possibly confusing, in which case it is better left out. However, if the group’s measurement results differ greatly and some participants have measured particularly small amounts of food waste, this option may be of interest to them.

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VARIATIONS:

- With only two project days, there is no further measuring phase, so the exercise described here is not suitable in this form. Instead, a shorter variant on reduction strategies is for participants to consider, with the help of the summary list of reduction options (presentation 4) and the worksheet “Handling food”, which reduction option suits their household and which they would like to implement in the near future. They can also think about how to get the members of their household to take part and whether they need anything else to implement it. In pair work, the participants can then tell each other about their plans and give each other feedback or additional ideas. In this shorter variant, however, the participants do not fill in worksheets but simply have a conversation in pairs in which they discuss the topic in less detail.

TIPS FOR EDUCATORS:

The Food Waste Tracker already gives participants general pointers to reduction options. However, these are not personalised according to the individual measurement results. We suggest developing one’s own reduction strategy here, as engaging with one’s own food waste makes it more comprehensive than the general reduction tips. A strategy of one’s own can be tailored more individually, and the peer review can provide additional support. If time is short, the choice of a reduction strategy can also be based solely on the reduction tips in the online module.

OPTIONS FOR FURTHER WORK:

With only two project days:

Unit 3b I: Project reflection

Unit 3c I: Further options for action

Unit 3c II: Closing cooking session

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MODULE 2C: Developing reduction strategies and research questions

In module 2c, the participants work out their own reduction strategy based on the research question they have already developed. They adapt the motivation strategy for the members of their household and carry out a peer review in pairs to revise their strategies. Finally, the second measuring phase is prepared in detail.

Unit 2c I: Developing a reduction strategy and adapting the motivation strategy

GOAL:

Participants develop an individual reduction strategy that fits their research question and adapt their motivation strategy accordingly. They plan the second measuring phase.

DURATION:

40 minutes

FORMAT:

Individual work

MATERIALS:

Presentation 5, worksheet “Reduction strategy/motivation strategy” (double-sided) for all participants

SUITABLE FOR:

In-depth individual work for the detailed planning of the following practical phase

ROOM ARRANGEMENT:

Group tables

LINK:

sustainability-education.net/foodlabhome-materials/#m2c-e1

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PREPARATION:

The educators prepare presentation 5 and lay out the worksheets.

PROCEDURE:

The educators explain that, to plan the second measuring phase, the reduction strategy will now be planned in detail and the motivation strategy adapted. Using presentation 5, they explain how to work on the questions listed on the worksheets. The participants work individually on the questions on the reduction strategy worksheet. The educators walk around and help the participants.

The same procedure then follows for the motivation strategy, which was already created on the first project day but now needs to be adapted to get the household members to take part in implementing the reduction strategy.

VARIATIONS:

- Depending on the time available, the worksheet can be worked on and discussed in more or less detail. It can also be given as homework.

TIPS FOR EDUCATORS:

Planning the implementation of the reduction strategy in detail and adapting the motivation strategy help the participants to deal with possible challenges in advance. This unit therefore helps to make the second measuring phase successful and satisfying, but it is not strictly necessary for the overall sequence.

OPTIONS FOR FURTHER WORK:

Unit 2c II: Peer review

Unit 2c II: Preparing the second measuring phase

With only two project days: end of project

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Unit 2c II: Peer review of the strategies developed

GOAL:

Participants assess another participant's reduction and motivation strategies and give each other feedback. They then revise their own strategies.

DURATION:

20 minutes

FORMAT:

Pair work

MATERIALS:

Presentation 5 ("Reduction strategies"), worksheet "Reduction strategy/ motivation strategy", worksheet "Peer review" (A5) for all participants

SUITABLE FOR:

In-depth revision of the material developed in the previous exercise "Developing a reduction strategy and adapting the motivation strategy", for detailed planning of the following practical phase

ROOM ARRANGEMENT:

Group tables

LINK:

sustainability-education.net/foodlabhome-materials/#m2c-e2

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

SUMMARY:

The participants read their neighbour's reduction and motivation strategies and write down strengths, weaknesses and suggestions for improvement. They give each other feedback and then revise their strategies.

PREPARATION:

The educators prepare presentation 5 and lay out the worksheet.

PROCEDURE:

The educators explain that pair work now follows in the form of a peer review, modelled on scientific research. The participants are asked to team up with the person next to them and exchange their worksheets on the reduction and motivation strategies. They read through their neighbour's ideas and answer the questions on the strengths and weaknesses of the strategy on the small worksheet "Peer review". They also write down suggestions for improvement. The educators point out that the worksheets have a front and a back and that both should be reviewed and assessed. After assessing each other's strategies, the participants give each other feedback. They then have the opportunity to adapt their strategies in line with the suggestions for improvement.

The educators announce the change of phases as needed (1. assess strategies, 2. give each other feedback, 3. incorporate feedback into one's own strategy).

TIPS FOR EDUCATORS:

This exercise is helpful for developing the reduction and motivation strategy but not strictly necessary for the overall sequence.

Peer review is a procedure used in science to assess scientific work, especially scientific publications. Independent reviewers ("peers") from the same field as the authors are asked to assess the quality of the work.

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Unit 2c III: Preparing the second measuring phase

GOAL:

Participants know the task, the procedure and the deadlines for the second measuring phase. They assess the second project day.

DURATION:

15 minutes

FORMAT:

Input and group discussion

MATERIALS:

Computer and projector, presentation 5 (“Reduction strategies”), blank flipchart sheets for all participants, flipchart with the task (second practical phase), if needed bowls and scales to borrow

SUITABLE FOR:

End of the project day with an outlook on the following practical phase

ROOM ARRANGEMENT:

Circle of chairs

LINK:

sustainability-education.net/foodlabhome-materials/#m2c-e3

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

SUMMARY:

The educators explain to the participants which tasks need to be done before the next project day (implementing the reduction strategy, measuring food waste, preparing a research poster). The educators hand out materials and hold a feedback round with the whole group.

PREPARATION:

The educators prepare the presentation, have all materials to be handed out ready and put up the flipchart (or similar) with the task.

PROCEDURE:

The educators explain to the participants that they will now implement the reduction strategy at home and then measure their food waste again in a second measuring phase. This is to find out how successful the reduction strategies were. Using a flipchart that sums up the task, the educators announce the start and end of the second measuring phase and explain that the results will be presented and discussed on the third project day. It is explained that data are entered with the personal login as in the first measuring phase and that the participants should again bring their measurement data digitally on their phone/laptop/tablet or as a printout.

The educators remind the participants that the point is not to measure as little waste as possible but to find out the actual amount of food waste, so that conclusions can be drawn about the effectiveness of the reduction strategies. It is repeated that the data are treated anonymously and not graded.

The educators again encourage the participants to persuade the members of their household to take part, for example by pointing out the contribution to climate protection made by reducing household food waste.

The educators explain to the participants that a research poster is to be prepared for the next project day and hand out blank flipchart posters to all participants. On the poster, the participants should record answers to the following questions:

- Which research question was investigated?
- What was implemented, when and how? (presented with text, photos and materials)
- Results: answer to the research question
- Assessment of the strategy implemented: what worked well? Where were there difficulties and how were they dealt with?

The educators remind the participants to bring any materials handed out (bowls/scales) back to the next meeting.

The participants are asked to look through their research folders and check whether any questions remain. Questions that need clarifying are discussed.

To finish, there is a short voluntary flash round in which the participants can give brief feedback.

VARIATIONS:

- Instead of a flash round, other (written) feedback methods can be chosen (see “Feedback methods” in the supplementary material).

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PRACTICE MODULE 2: SECOND MEASURING PHASE

In practice module 2, the participants measure their food waste at home during a second agreed measuring phase and enter it into the Food Waste Tracker. In addition, they prepare a research poster in which they document their research process for the other participants.

Unit 2 I: Second measuring phase at home and preparing the research posters

GOAL:

Participants apply the chosen reduction strategy to their household and investigate the amount of and reasons for food waste during the agreed period. They analyse their research results and describe their research process in the form of a research poster.

DURATION:

One week

FORMAT:

Individual work at home

MATERIALS:

Scales, bowl, computer/tablet/phone, research folder, blank flipchart sheets, markers, individual link with ID for logging into the Food Waste Tracker

SUITABLE FOR:

Applying a reduction strategy in the household, another measuring phase, preparing the next project day

LINK:

sustainability-education.net/foodlabhome-materials/#pp2-e1

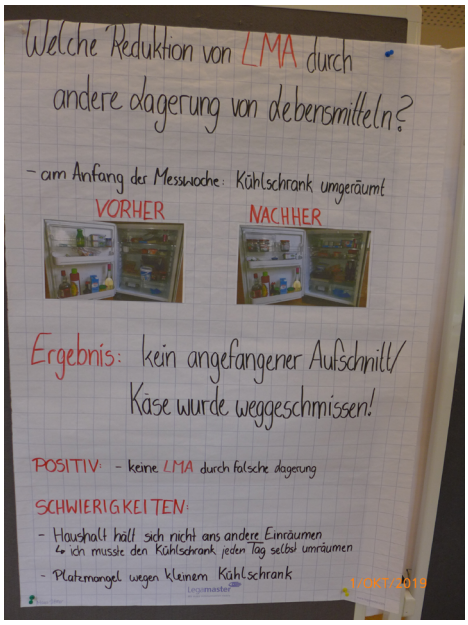
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SUMMARY:

The participants implement the reduction strategy they have chosen. After one week, they additionally measure their food waste for a further week and enter all required data (amount of food waste per food category, reasons for food waste) into the Food Waste Tracker. At the end of the measuring phase, they print out their data from the second measuring phase for the third project day or save their overall evaluation digitally. The participants prepare a research poster (for examples see Fig. 9 and 10), for which they choose a title themselves and prepare answers to the questions set (see preparing the second measuring phase).

TIPS FOR EDUCATORS:

- It is a good idea to offer participants a way of contacting you during the measuring phase so that questions can also be answered between the project days (by email, chat, online learning platform, ...).
- The second measuring phase should only take place once the reduction strategy has already been implemented for a week. This makes it possible to detect possible effects of the reduction strategy (e.g. rearranging the fridge) in the second measuring phase. So the reduction strategies are first implemented for a week, and food waste is then measured in the following week. Depending on the participants' motivation and willingness, longer periods can also be chosen.



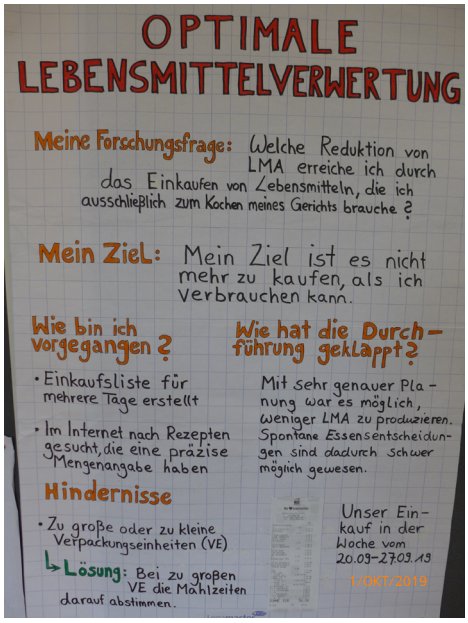


Fig. 9 and 10. Research posters prepared by participants during the second practical phase at home (photos: FoodLabHome)

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MODULE 3A: Presenting and reflecting on the research results (research posters)

In module 3a, the research results of the second measuring phase are presented in a poster exhibition. In small groups, the participants evaluate their research experiences and present them to the group. The educators then present the climate impact of the group's research results and a comparison of the two measuring phases. These results and how meaningful they are are discussed in the group.

Unit 3a I: Welcome and agenda

GOAL:

Participants understand the course of the project so far and know the agenda for the third project day.

DURATION:

10 minutes

FORMAT:

Input

MATERIALS:

Flipchart with the day's agenda

SUITABLE FOR:

Start of the project day, without going into content

ROOM ARRANGEMENT:

Standing
circle

LINK:

sustainability-education.net/foodlabhome-materials/#m3a-e1

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

PREPARATION:

The educators put up the flipchart with the day's agenda.

PROCEDURE:

The educators welcome the participants, sum up the last project day and the tasks for today's project day and present the agenda for the third and final project day.

VARIATIONS:

- The start of the day can also be supplemented by a short game together (energiser games, see supplementary material).

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Unit 3a II: Presenting one's own research projects (research posters)

GOAL:

Participants present their own research projects. They assess the effectiveness of their reduction strategies and develop a group conclusion.

DURATION:

50 minutes

FORMAT:

Individual presentations and discussion in small groups

MATERIALS:

Research posters of all participants, pinboards and pins (enough for all posters), worksheet "Group conclusion" for each participant

SUITABLE FOR:

Bringing together the content of the previous units, building on the first and second measuring phases, exchange among participants

ROOM ARRANGEMENT:

No tables needed

LINK:

sustainability-education.net/foodlabhome-materials/#m3a-e2

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

SUMMARY:

The participants present their own research and listen to the reports of the other participants in a small group. They formulate a joint conclusion on the effectiveness of the reduction strategies they implemented and present it to the whole group.

PREPARATION:

The educators collect the research posters in advance and put them up as a poster exhibition, sorted by topic (e.g. shopping, storage, cooking and eating habits, special reduction strategies).

PROCEDURE:

The educators first ask the participants to walk freely around the room for about 5 minutes, look at the other participants' posters and ask the authors questions if they wish (Fig. 11). Participants who applied the same or similar reduction strategies then come together and receive the worksheet "Group conclusion". In their small group, the participants take turns presenting their poster for 3–4 minutes each. The group members can ask questions. In this way, participants can recognise parallels to or differences from their own strategy and the course of their research. The small group then formulates a conclusion on the effectiveness of the strategy with regard to the amount of food waste and GHG (How much food waste or GHG emissions were you able to save with the strategy?) and with regard to experiences in the household (What worked well/badly when implementing your strategy and how did you deal with it?). Finally, the small groups present their conclusion to the whole group.

VARIATIONS:

- If small groups cannot be formed by identical reduction strategies because there are not enough people, small groups with different reduction strategies can be formed. The worksheet "Group conclusion: different strategies" is provided for this.

- If participants have pursued anti-strategies, i.e. dropped a practice that previously reduced food waste, they can join the group that applied this reduction strategy (e.g. introducing shopping lists and no longer using shopping lists). Alternatively, the participants who pursued an anti-strategy can form a small group of their own and work on the special worksheet "Group conclusion: anti-strategy".

TIPS FOR EDUCATORS:

The small groups can be formed according to how the posters are arranged in the room. The educators can arrange the posters in advance so that strategies that are to form a small group hang close together. When the participants stand by their poster, they quickly find themselves in a small group with their neighbours.

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Fig. 11. Participants presenting their research projects (photo: FoodLabHome)

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

Unit 3a III: Reflecting on the climate impact of individual and group research results

GOAL:

Participants recognise the (climate) relevance of their food waste. They compare the climate impact of different food categories and assess the effectiveness of the reduction strategy they implemented.

DURATION:

30 minutes

FORMAT:

Input, group discussion

MATERIALS:

Computer and projector, group research results of the second measuring phase (present online if possible; detailed information on using the Food Waste Tracker in chapter 4 of the handbook)

SUITABLE FOR:

Bringing together the content of the previous units in depth, building on the first and second measuring phases

ROOM ARRANGEMENT:

Semi-open circle of chairs

LINK:

sustainability-education.net/foodlabhome-materials/#m3a-e3

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SUMMARY:

The educators present the group results of the second measuring phase and a comparison of the two measuring phases. In a group discussion, the participants reflect on the results and how meaningful they are.

PREPARATION:

The educators prepare the evaluation of the group results. To do so, the group results of the second measuring phase are opened in the evaluation view of the Food Waste Tracker. Depending on what you want to evaluate, the sorting function can be used with different criteria. To compare the two measuring phases, the group results of the first measuring phase also need to be available. Optionally, the educators can download the measurement results and prepare them as a presentation.

PROCEDURE:

The educators tell the participants that the collective research results will now be presented and that they will have the opportunity to compare their own results with those of the whole group. The participants are therefore asked to open their own research results and look at them in parallel. Short periods of individual reflection are allowed for during the presentation.

The educators now present the measured amount of food waste and the associated GHG emissions for the second measuring phase. The evaluation initially follows the same pattern as for the first measuring phase. The educators again illustrate the climate impact with everyday comparisons, i.e. they explain that the climate impact of the food waste corresponds, for example, to a certain number of hours an LED lamp can burn or a certain number of cups of tea that can be boiled. In addition, the amounts of food waste and the climate impact are sorted by food category, so that the group can work out which foods were thrown away in large quantities and which food categories had a particularly high climate impact. The reasons for the food waste can also be evaluated and sorted by various categories. This makes it possible, for example, to work out which reasons led to particularly high GHG emissions.

The results are compared with those of the first practical phase and discussed in open reflection rounds.

Optionally, the climate impact of the data collected in both measuring phases can then be compared with the results of other studies. According to the Swiss study by Beretta et al. (2017), avoidable food waste alone releases GHG emissions of 253 kg CO2eq per person per year into the atmosphere.

After the presentation of the collective research results, a group discussion follows on how meaningful the results are. The following aspects, for example, can be addressed:

- Difficulties in carrying out the measurements in the household (e.g. lack of motivation among household members)
- Duration and timing of the measurements (e.g. holidays, a week with a birthday party)
- Inaccuracy and error-proneness of the measuring method (e.g. wrong number typed in, wrong reason selected)
- Validity of the data basis (using average values can distort results, e.g. with regard to the season and origin of food)

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MODULE 3B: Reflecting on the learning and research experience

At the end of the project, module 3b reflects on the project's effects and how it was perceived, in two small groups using the "card query" method.

Unit 3b I: Project reflection

GOAL:

Participants assess the effects of the project and how they perceived it.

DURATION:

60 minutes

FORMAT:

Card query in two small groups

MATERIALS:

4 pinboards, moderation cards labelled with topics, at least 5 moderation cards per participant, pins, markers for all participants, handout with in-depth questions (2 copies for educators)

SUITABLE FOR:

After evaluating the content of the project, before the end of the project

ROOM ARRANGEMENT:

Two semi-open circles of chairs

LINK:

sustainability-education.net/foodlabhome-materials/#m3b-e1

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SUMMARY:

In two small groups, the effects of the project and how it was perceived are reflected on and discussed in a card query followed by a conversation, looking at certain topics one by one.

PREPARATION:

The educators prepare four pinboards (two per group), with moderation cards bearing headings pinned to them (2x first pinboard: food (waste), climate change, research, your households, yourselves; 2x second pinboard: project meetings, practice, doing research, expectations).

PROCEDURE:

The group is divided into two small groups and two semi-open circles of chairs are formed. One group first works on the effects of the project, the other first on how the project was perceived. Then they swap.

In the small group on the effects of the project, the educators first explain that the learning and research experiences will now be reflected on. The guiding question for this small group is: what have you learned through this project? (additionally: is there anything you now do differently or think about differently after the project?) The participants are asked to write their answers on moderation cards, relating them as far as possible to the topics "food (waste)", "climate change", "research", "your households" and "yourselves". It is pointed out that a new card should be used for each topic. At the beginning, the educators explain what each topic covers, for which they can use the handout "In-depth questions". Once the participants have written their answers on moderation cards, they give them to the educators, who pin the cards to the wall in clusters. The educators then sum up the participants' contributions and, if necessary, ask follow-up questions or ask for additions. In this way, the effects of the project are discussed topic by topic in the small group.

In the small group on how the project was perceived, the educators first point out that they would welcome honest feedback on the project and that these contributions will not be graded. The procedure is the same as described above. The guiding question in this small group is: how did you experience this project? (additionally: what was exciting or fun? What was boring or less fun?) In this group, too, the participants are asked to write their answers on moderation cards and relate them to the topics "project meetings", "practice", "doing research" and "expectations". If needed, the educators can make the topics more concrete with in-depth questions (see handout "In-depth questions"). Once the answers in this small group have also been collected, clustered on the pinboard and discussed, the groups swap topics and work on the questions of the other topic on a pinboard that has not yet been used.

VARIATIONS:

- This unit can also be carried out with the whole group without dividing it. The advantage of smaller groups is that participants have more opportunities to speak and a more personal exchange is possible.
- Instead of a card query, the exchange on how the project was perceived can also use the feedback method "Target" (see "Feedback methods" in the supplementary material).
- If there is no time for this unit, the guiding questions presented here can be integrated into the final round of module 3c (What have you learned through this project? How did you experience this project?)

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MODULE 3C: Further options for action and closing cooking session

Unit 3c I: Getting to know options for action beyond the household

GOAL:

Participants present ways of preventing food waste that go beyond the household.

DURATION:

30 minutes

FORMAT:

Small-group exercise

MATERIALS:

Info sheets “Further options for action” (printed for small groups, one copy for every 2 participants) or online module

SUITABLE FOR:

Thematic outlook on further aspects of food waste, end of project

ROOM ARRANGEMENT:

5 group tables

LINK:

sustainability-education.net/foodlabhome-materials/#m3c-e1

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SUMMARY:

In small groups, the participants work on the examples of options for action beyond the household that can be found in the online resources, and then present them to the group.

Online option on options for action:

sustainability-education.net/foodlabhome-online-module/ #beyond-home

PREPARATION:

The educators decide whether the participants should do this unit on computers/tablets or offline with printed info sheets. Working digitally requires computers/tablets for the whole group. For the offline version, the educators print out the information on one option for action for each group table (several copies per table).

PROCEDURE:

For the offline version, the educators divide the group into 5 small groups and assign an option for action to each. The educators explain that the participants should now read the information on the option assigned to them and summarise it in their small group. After 15 minutes, the small groups take turns explaining to the whole group what their option for action involves.

VARIATIONS:

- The educators can also ask the participants to research their option for action online beyond the FoodLabHome online module and then share their findings with the whole group.
- If possible, a guest from a local initiative can be invited instead of the small-group exercise. After being introduced by the educators, the guest describes what makes the local initiative special and what opportunities there are to get involved. This is followed by an exchange in which participants can ask questions.
- This unit can also be combined with the closing cooking session. While the participants eat the snacks they have prepared at the group tables, the guest can present the initiative and questions can be asked.



Fig. 12. Closing cooking session with leftover food (photo: FoodLabHome)

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Unit 3c II: Closing cooking session

GOAL:

Participants cook with leftover food and determine its climate impact. They name changes in behaviour in their households that they have made or will make.

DURATION:

60 minutes

FORMAT:

Cooking in small groups, eating, final round

MATERIALS:

Computer, projector, presentation 6 (“Recipes”), recipes as handouts (one copy per table), food & kitchen utensils (detailed list in “Closing cooking session: costing of food and materials” in the download section), moderation cards and markers

SUITABLE FOR:

Activating unit to conclude the project

ROOM ARRANGEMENT:

Group tables, then circle of chairs

LINK:

sustainability-education.net/foodlabhome-materials/#m3c-e2

AI-generated translation of the German original (FoodLabHome 2020) · not reviewed by the authors · the German original applies

SUMMARY:

In small groups, the participants each prepare a recipe from leftover or rescued food (Fig. 12). The snacks are then eaten at the group tables. The session ends with a short, voluntary final round.

PREPARATION:

The food, recipes (handouts) and utensils are laid out at group tables for preparation.

PROCEDURE:

The educators explain to the participants that they will now prepare snacks from food that would otherwise mostly have ended up in the bin. The aim is to show that leftover food is often still good to eat. The educators go from table to table and, using the food and recipes laid out there, present the snacks to be prepared. The participants are then asked to choose a group table and prepare the snacks there together. They are also asked to design a sign showing the name of the snack and the GHG emissions of this food. When forming the groups, the educators make sure the groups are of similar size (2–5 participants). The number of groups depends on the size of the whole group. It is also possible to prepare only a smaller selection of the snacks suggested in the presentation.

When all the snacks are ready, they are placed on a table as a buffet (Fig. 13) together with the signs. The buffet is then opened, with each group briefly presenting which snack it prepared and how high its GHG emissions are. All participants may now help themselves to snacks and eat them at their seats.

To finish, a circle of chairs is formed and the participants are invited, in a voluntary final round, to share what they did (not) like and what they have changed or will change in their household as a result of the project.



Fig. 13. Buffet with snacks made from leftover food (photo: FoodLabHome)

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4. The FoodLabHome online resources

Online resources:

sustainability-education.net/foodlabhome-online-module

Teaching and learning materials:

sustainability-education.net/foodlabhome-materials

Food Waste Tracker:

sustainability-education.net/foodlabhome-tracker

This chapter presents the FoodLabHome online resources. In addition to the Food Waste Tracker mentioned above, the FoodLabHome project website (www.foodlabhome.net) offered further online learning resources and downloads. *[Translator's note: this chapter describes the website and the Food Waste Tracker as they worked in 2020. The resources are now available at sustainability-education.net (English) and bne-sachunterricht.de (German); functions and screens may differ from the description below.]*

The online learning resources

Under the tab "Learning resources", various topics are presented through videos, graphics and games. These resources are designed as an alternative to face-to-face sessions, so the content is the same. The online learning resources can be used both for individual work at home and in face-to-face sessions.

Downloading teaching and learning materials

In the "Teaching and learning materials" section, all materials needed to run the units described are available for download. The units are described only briefly and supplemented by downloads of the individual teaching and learning materials (presentations, worksheets etc.). Energiser games, feedback methods, flipchart templates and a letter template for parents/guardians and household members can also be found there as supplementary material.

The Food Waste Tracker

How the Food Waste Tracker is used depends on the purpose and scope of the project. Without a login, data can only be entered once and cannot be saved. In this case, users receive some information on the carbon footprint of the food, with additional comparisons (calculated in CO2eq), directly after entering their data.

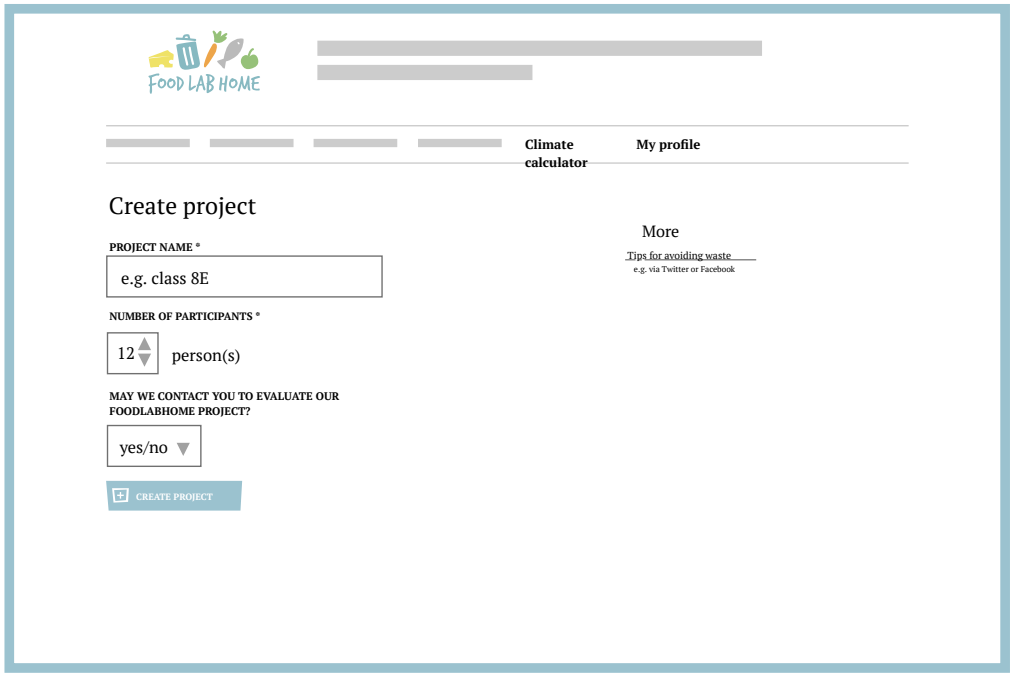
If the participants are to enter several measurements over a period of time during a measuring phase at home, **logins must be created for all participants**. In this case, data entry and the display of the evaluation work somewhat differently. More detailed information is requested, and after data entry more detailed evaluation information and options are displayed, which can be used for the following units on the project days. Using the Food Waste Tracker over a period of time requires some preparatory steps by the educators. This preparation and the basic steps of data entry and evaluation are described below.

Creating the project and the logins for participants

If the Food Waste Tracker is to be used for running FoodLabHome project days, educators need to create a login in the role of project leader as well as logins for all participants.

Among other things, the project leader role makes it possible to generate access for all participants and later to view an overall evaluation of the group results. Once educators have created logins in the project leader role, they can create a project. Educators obtain the project leader role by selecting the "Create project" button at www.foodlabhome.net/hb. They then have to create a WordPress account, which allows them to create projects.

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To do so, they enter a **project name** (e.g. class 8E) and the **number of participants**. Note that no further people can be added later in the project. The project leader is not counted as a participant and cannot enter waste data. At this point, the educators as project leaders must also choose whether they wish to be contacted by the FoodLabHome project for evaluation purposes. Once the project has been created, the website generates an individual login for each participant, displayed in a list of QR codes and links. For the measuring workshop on the first project day, it is advisable to create a separate, additional practice project just for this purpose (e.g. "Measuring workshop class 8E") with the number of small groups as the number of participants (e.g. enter 5 participants for 5 planned small groups).



The educators can now select "Print list" and hand out an individual paper slip to each participant. Before handing out the slips with the individual links, it is advisable to record which slip goes to which participant (person 1 = first name and surname, person 2 = first name and surname, etc.), so that the educators can give the links to the participants again if necessary.

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Explainer videos:

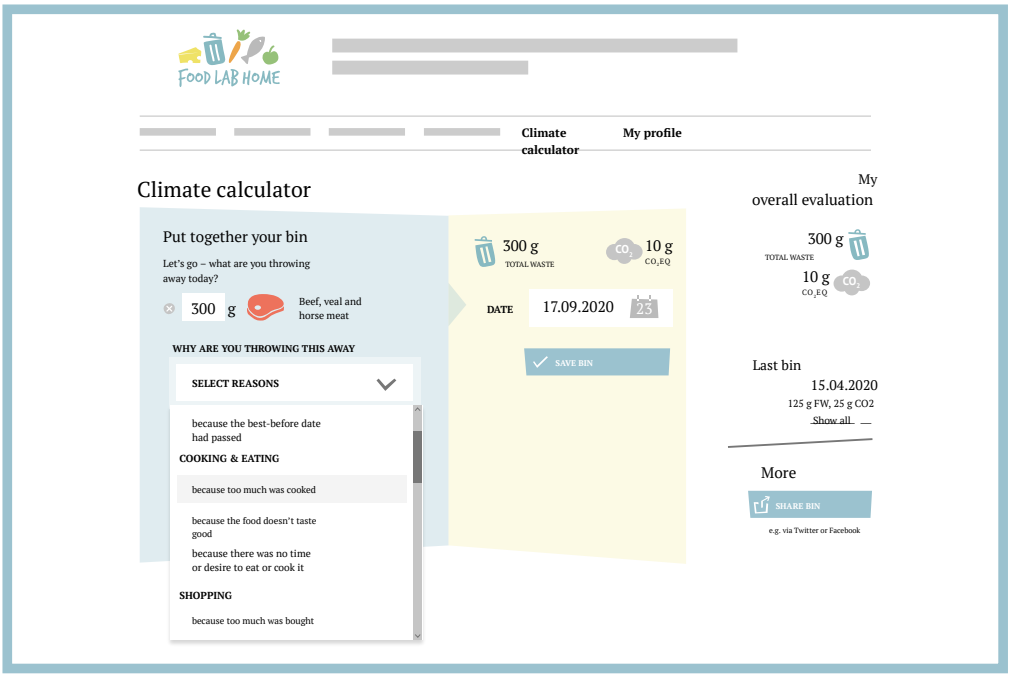
sustainability-education.net/foodlabhome-tracker

[(measuring and entering data)]

Data entry

During the project, the participants will measure food waste in their households several times and enter the data into the Food Waste Tracker. The explainer videos provide step-by-step instructions on measuring food waste correctly and entering the data correctly into the Food Waste Tracker. They can be used to prepare for the first measuring phase, but also at home when participants are unsure.

To enter their data, the participants first have to log in by opening the link assigned to them. Each time they have measured food waste, they make an entry and save it separately. Each entry of waste is saved in the Food Waste Tracker as a separate "bin". The participants proceed as follows when entering data:



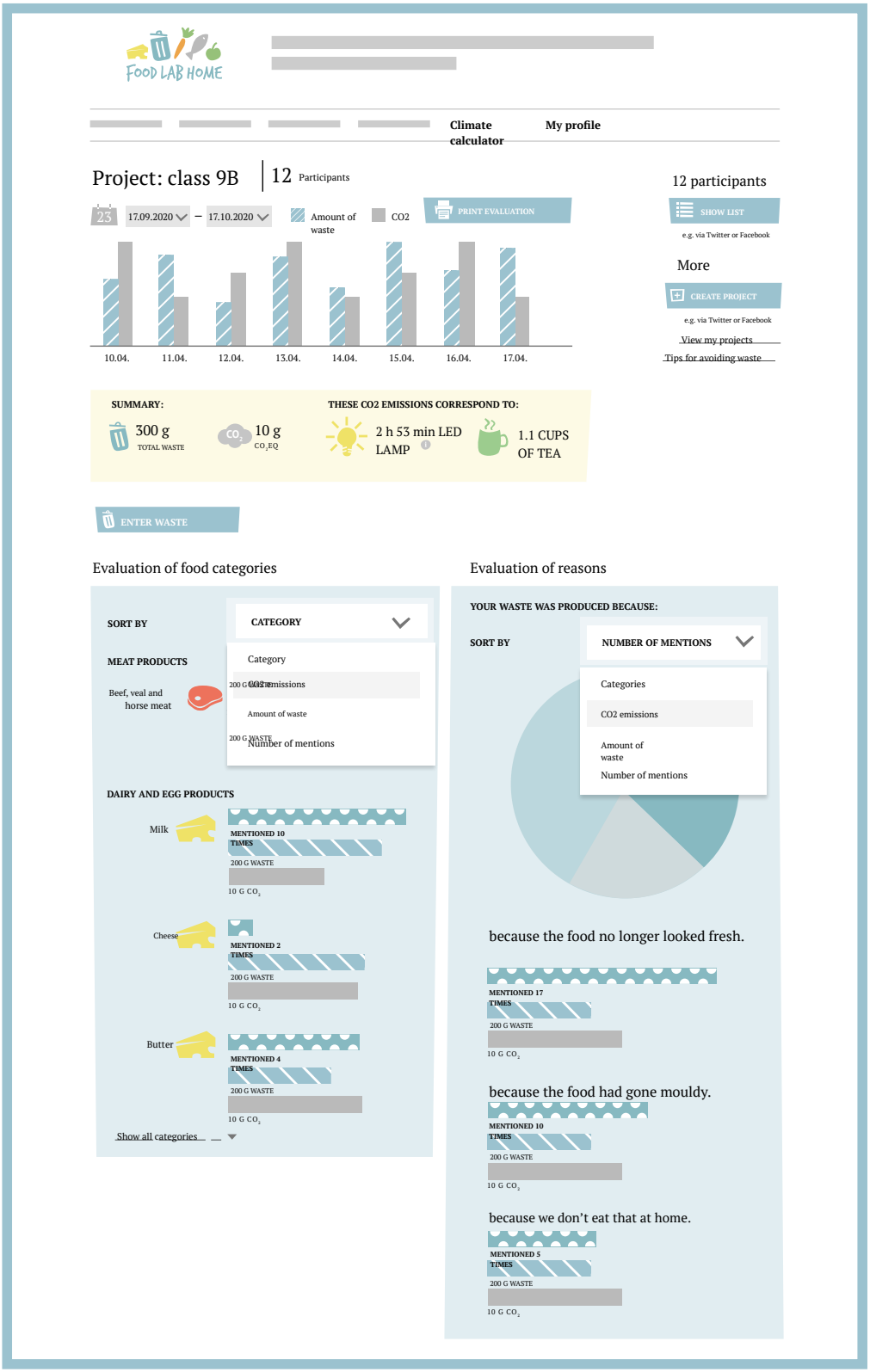
The participants select "Enter waste". They can then select the relevant food category and enter the amount (in grams). Further foods can be selected and entered one after the other. For each item of food waste entered, the participants are also asked why the food is being thrown away and can choose from a list of possible answers. They are also asked for how many people the waste is being entered. Before saving the information entered, the date on which the food waste occurred must be given. The information requested here will be important later for evaluating the measuring phases.

Evaluating the data

In the case of one-off data entry (without login), various calculations on the waste entered appear after data entry. The amount of food waste is shown together with the corresponding amount of CO2eq. The tracker also shows by what factor the amount of food waste entered is higher or lower than the daily per capita amount of food waste in Germany, so that participants can compare their amounts with those of the rest of the population. In addition, two everyday comparisons show how high the GHG emissions caused are: how long an LED lamp could burn and how many cups of tea could be boiled until the same amount of GHG emissions would be caused. The yellow-red scale also shows how much GHG emissions (in CO2eq) are released by the individual foods entered, so that the different CO2eq balances of different foods can be understood from their position on the scale. Explanatory information on these

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charts is displayed when the mouse pointer is moved over the corresponding field.



With **data entry with login**, a more detailed evaluation is displayed which, in addition to the total amounts of food waste and GHG and the LED lamp and cups of tea comparisons, includes several charts. The amounts of food waste and GHG are shown over time, with the period selectable in the calendar view. In a detailed evaluation, the amounts of food waste and GHG can also be shown in a bar chart sorted by various aspects. The data can be sorted by food category, by frequency of mentions, by amount of waste and by

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GHG emissions.

In addition, the reasons given for the food waste are shown in a pie chart and a bar chart. Here, too, the display can be sorted by frequency of mentions, amount of waste and GHG emissions, so that the evaluation can be shown according to interest. For example, it can be worked out which foods were thrown away particularly often and what climate impact this has. With the appropriate sorting, it can also become clear which reasons lead to the largest amounts of waste or GHG.

In the evaluation view, the participants can select **"Print evaluation"** themselves so that it is available for further use on the project days. The sorting currently selected is always printed. The participants should therefore select the same evaluation settings (period, sorting of the food category evaluation and sorting of the reasons evaluation) for printing. If the technical equipment on site allows it, printing together in a room with a printer is recommended, so that the participants can be guided in selecting the sorting in the evaluation view and in printing the evaluation. If there is no access to a printer, the participants can also bring their evaluation digitally on their phone and open it online live in the classroom.

In their evaluation, the educators as project leaders can view the **overall evaluation of the project** based on all the group's entries added together and then use it on the project days. This evaluation in the project leader role is therefore the basis for evaluating the whole group. For use during the project day, an **online presentation** in the logged-in area is recommended, so that the sorting functions of the evaluation can be selected and shown flexibly. After the first measuring phase, the educators should print the group results or save them as a PDF so that the data can be compared after the second measuring phase.

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5. Further information and resources

Initiatives to prevent food waste (in Germany):

Etepetete – Etepetete is an online retailer of fruit and vegetables that would otherwise not reach the shops because of their appearance. The produce has small blemishes, slight bruises or does not meet the EU standards for the shape of fruit and vegetables. Working with a network of organic farmers, the products are delivered to households as organic boxes.

https://etepetete-bio.de

Foodsharing – Foodsharing is an online platform for distributing surplus food from private households or food businesses. Organised in local initiatives, volunteer "foodsharers" collect food that would otherwise be thrown away from retailers and producers and pass it on via open food shelves, known as "Fair-Teiler".

www.foodsharing.de

Frankfurter Knärzje – This "zero-waste beer" is a bread beer brewed from unsold bread. In the Hessian dialect, "Knärzje" is the end piece of a loaf.

https://www.knaerzje.de/

Querfeld – Querfeld delivers natural diversity: high-quality organic fruit and vegetables that are sorted out at harvest because they do not meet retailers' ideas of how produce should look. Yet taste is not a question of appearance. Querfeld's vision: a fair and sustainable food supply for everyone.

https://querfeld.bio

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Restlos genießen – The campaign "Restlos genießen" (enjoy without leftovers) aims to reduce food waste in restaurants by letting guests take leftover food home in a "Beste-Reste-Box" (best leftovers box), which the campaign hopes will become a regular part of restaurant culture. It was initiated by the association Greentable, which promotes sustainability in the restaurant sector, and the initiative "Zu gut für die Tonne!" of the German Federal Ministry of Food and Agriculture.



https://www.greentable.org/projekte/restlos-geniessen/

Restlos glücklich e. V. – Restlos glücklich works for greater appreciation and more conscious consumption of food. The association offers educational projects and hands-on activities such as free workshops for daycare centres and schools or cooking workshops for teams, in which rescued food is cooked and useful tips for handling food more sustainably are given.

https://www.restlos-gluecklich.berlin

Sir Plus – In its "rescue markets" and online shop, SIRPLUS sells surplus food and products that are perfectly good to eat but were sorted out by farms, wholesalers, producers or manufacturers.

https://sirplus.de/

Tafel – The Tafel is a charitable organisation that distributes food to socially and economically disadvantaged people. The Tafeln are organised locally and rely on volunteers who collect surplus food from food businesses and pass it on free of charge or for a small fee.

https://www.tafel.de/

Too good to go – Via the app "Too Good To Go", food businesses such as restaurants, bakeries, cafés, hotels and supermarkets can sell their surplus food at a reduced price to customers who collect it. Customers can see participating businesses and the food on offer nearby in the app, buy directly in the app and collect in the shop.

https://toogoodtogo.de/de

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Wirf mich nicht weg – This is an educational campaign against food waste that offers project days at primary schools. The website offers practical tips in the form of posters for download. The programme is run by the Regional Environmental Centre (RUZ) Hollen.

https://www.wirf-mich-nicht-weg.de/material-zum-download.html

Further initiatives in education, climate, agriculture and food

BAGLoB – The "Bundesarbeitsgemeinschaft Lernort Bauernhof e.V." (federal working group for the farm as a place of learning) aims to let people experience everyday farm life and how food is produced and processed. The nationwide umbrella organisation links agriculture and educational institutions and provides information on opportunities for learning on the farm.
https://baglob.de/

Die Verbraucherzentrale – The website of the German consumer advice centres offers extensive information on food production, ingredients and healthy eating, as well as information on nutritional advice.
https://www.verbraucherzentrale.de/wissen/lebensmittel

GemüseAckerdemie – The educational programme of the GemüseAckerdemie (vegetable academy) aims to give children and young people more knowledge about natural processes, food production and agriculture and to promote healthy eating and sustainable consumption. In the one-year programme, participating school classes or kindergarten groups create a vegetable plot and look after it for an entire season.

gemueseackerdemie.de

Klimatarier – The Klimatarier calculator can be used to determine the CO2 emissions of food (before throwing it away!). The website suggests seven steps towards a climate-friendly diet.

https://www.klimatarier.com

KlimaTeller app – With the KlimaTeller app, restaurants and caterers can measure the CO2 emissions of their dishes, develop particularly climate-friendly dishes and offer them with the KlimaTeller label. The initiative was developed by the association Greentable, which promotes sustainability in the restaurant sector.
https://www.greentable.de/klimateller-app/

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Nahgast – By entering ingredients, quantities, method of preparation, storage and production conditions, the Nahgast calculator determines how compatible dishes are with the environment and health and how fair they are to people and animals. Based on an extensive database, the calculator determines whether a dish is recommendable in these areas.
https://www.nahgast.de

Slow Food – A worldwide movement, organised in local groups, that promotes regional and enjoyable food as a counter-movement to globalised and uniform fast food. Its educational programme includes visits to farms and production sites and so-called taste experiences.

https://www.slowfood.de

Tafel-Akademie – The educational programme of the Tafel-Akademie is geared to the needs of Tafel volunteers. Topics include volunteer and conflict management and food literacy.

www.tafel-akademie.de

Further information on food waste:

Beretta, C., Stucki, M., Hellweg, S. (2017): Environmental Impacts and Hotspots of Food Losses: Value Chain Analysis of Swiss Food Consumption. In: Environmental Science and Technology (2017), 51, 11165–11173.

The study contains detailed quantitative information on the amounts, causes and environmental impacts of wasted food. The calculations of the FoodLabHome Food Waste Tracker are based on the data from this study.
https://pubs.acs.org/doi/10.1021/acs.est.6b06179

Kranert et al. (2012): Ermittlung der weggeworfenen Lebensmittelmengen und Vorschläge zur Verminderung der Wegwerfrate bei Lebensmitteln in Deutschland. Stuttgart.

Comprehensive survey (in German) of the amounts of food waste in Germany, published by the University of Stuttgart on behalf of the German Federal Ministry of Food, Agriculture and Consumer Protection.

https://www.bmel.de/SharedDocs/Downloads/DE/_Ernaehrung/Lebensmittelverschwendung/Studie_Lebensmittelabfaelle_Kurzfassung.pdf?__blob=publicationFile&v=3

Thünen-Institut (2019): Lebensmittelabfälle in Deutschland – Baseline 2015. Im Auftrag des Bundesministeriums für Ernährung, Landwirtschaft und Verbraucherschutz. Braunschweig.

Overall balance (in German) of the food waste produced in Germany, compiled according to uniform EU recording criteria. A study commissioned by the German federal government.

www.bmel.de/SharedDocs/Downloads/DE/_Ernaehrung/Lebensmittelverschwendung/TI-Studie2019_Lebensmittelabfaelle_Deutschland-Kurzfassung.pdf?__blob=publicationFile&v=3

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WWF Deutschland (2015): Das große Wegschmeißen – Vom Acker bis zum Verbraucher. Ausmaß und Umwelteffekte der Lebensmittelverschwendung in Deutschland. Berlin.

Study (in German) on food waste along the global value chain, prevention potential and the climate impact of food losses.

http://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/WWF_Studie_Das_grosse_Weg-schmeissen.pdf

WWF Deutschland (2012): Tonnen für die Tonne. Berlin.

Study (in German) on food waste, meat consumption and land use

http://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/studie_tonnen_fuer_die_tonne.pdf

Further educational material on food waste (in German):

Endlich Wachstum – Lebensmittel zum Zweck. – A set of methods on agriculture and food in connection with the growth-based economic system.

https://www.endlich-wachstum.de/kapitel/lebensmittel-zum-zweck

Ernährungs- und Verbraucherbildung (EVB) – This website provides extensive material on valuing and wasting food. The 26 modules with descriptions of methods and working materials can be used independently of each other and adapted to the lesson in question.

http://www.evb-online.de/schule_materialien_wertschaetzung_uebersicht.php

Foodsharing-Akademie – The Foodsharing-Akademie offers educational materials on food waste and climate justice for free download. The "method buffet" contains suggestions for workshop sequences. The "pantry" also contains compact information on food waste and foodsharing, a collection of methods, an overview of current studies and literature on the topic.

www.foodsharing-akademie.org/

Lernzirkel „Köstlich und kostbar." – This educational material for lower secondary level, published by "Kern – Kompetenzzentrum für Ernährung" (Bavaria), comprises several modules with complete teaching material on food waste.

http://www.kern.bayern.de/shop/kompendien/113932/index.php

„Think Globally, Act Locally. Blutige Handys? Lebensmittelverschwendung? Erdüberlastung? Wir können die Welt gerecht gestalten!" – This methods booklet by INKOTA contains workshops on global learning for young people aged 14 to 20. The educational material, which can be downloaded free of charge, includes a fully worked-out project day on food waste.

https://webshop.inkota.de/produkt/didaktisches-material-download/think-globally-act-locally

Zu gut für die Tonne – The campaign offers an extensive collection of materials on food waste (school materials and studies). The nationwide strategy, commissioned by the German Federal Ministry of Food and Agriculture, is aimed at consumers and at everyone responsible along the value chain. Among other things, a federal prize is awarded and a nationwide action week is held every year.

https://www.zugutfuerdietonne.de/service/publikationen

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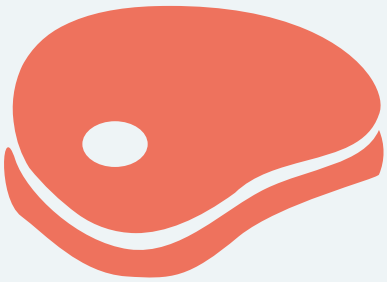
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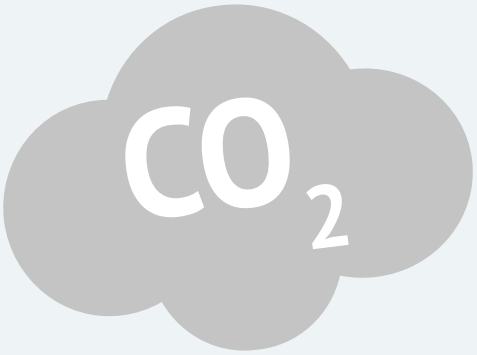
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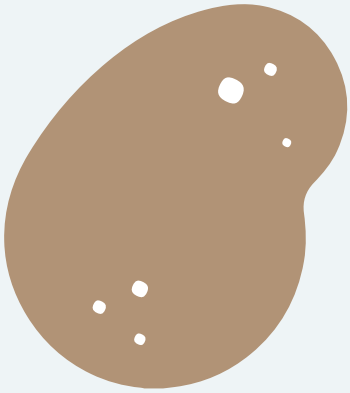


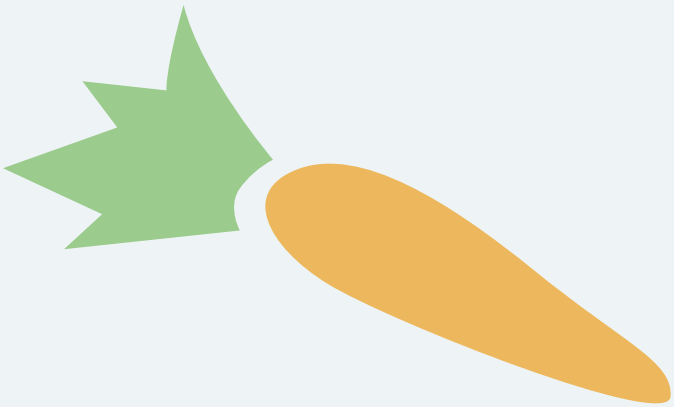
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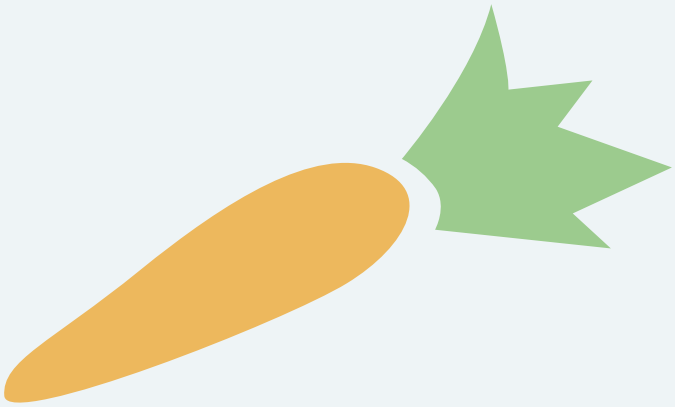


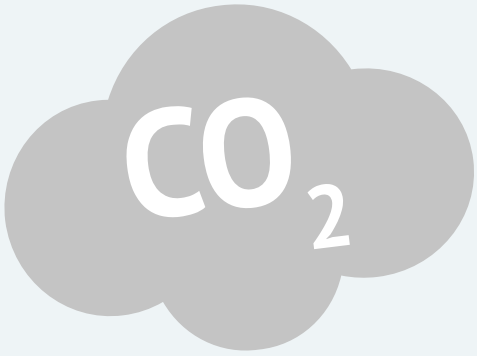






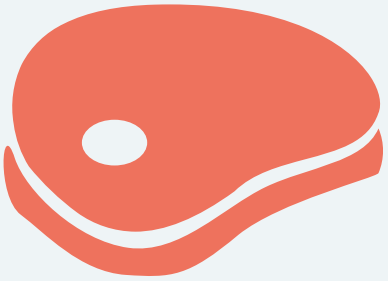
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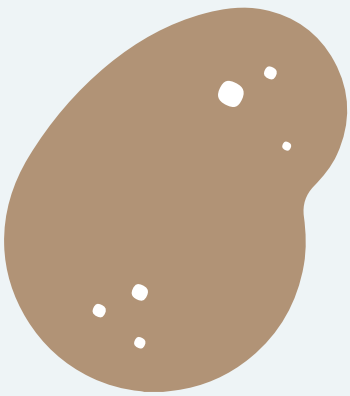


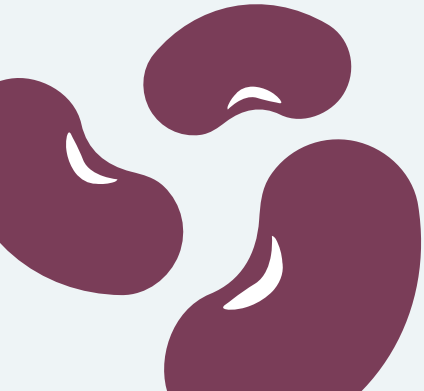












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