ABOUT THE EXHIBITION

FOODWEB – Baltic environment, food and health: from habits to awareness

AHHAA's new exhibition **„Aha, Red Herring"** is an outcome of a project called **FOODWEB** that is carried out by the Central Baltic INTERREG IV A Program and is financed by European Regional Development Fund. The new exhibition was opened on May 31th and over 60 000 people (from Estonia and abroad) have visited us since then.

Our purpose is to show the relationship between people, food and the environment by using interactive exhibits. For example, did you know that the Baltic Sea is one of the largest inland seas in the world? It is also extremely exposed to damage caused by human activity. Polluted water affects the fish living in Baltic Sea and when they end up on our dinner plates, the pollution affects us as well!

The message we want to send out to the people visiting this exhibition is to be aware of one's everyday food choices, because every step in food production and consumption will leave a mark on the environment and on our own health.

We have divided the exhibition into three parts: energy in food, food production and Baltic Sea environment. We have eleven exhibits with information stands and three general information columns to lead in the exhibition parts.

From November 2013, the whole exhibition or parts of it are available for rent without fee (on the condition that access to the exhibits does not require any admission fee). For more information and technical description, please concact Triinu Vakmann, the project manager on ***triinu.vakmann@ahhaa.ee****.*

EXHIBITS

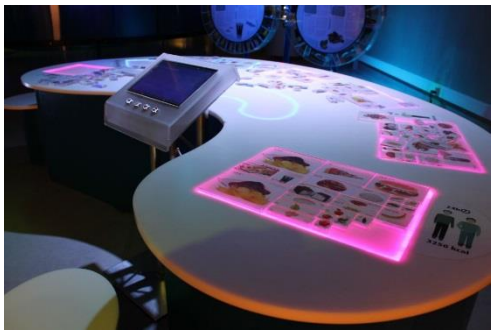
1. ENERGY IN FOOD

1. Daily Intake

Your task is to choose a hole that most resembles your daily energy requirement and fill it with preferred foods. Use the blocks with pictures of different foods. Blocks are also different-sized. Each block corresponds to a certain amount of energy (in kilocalors). The bigger the block is, the more energy the depicted food provides. Quantity of the food is given on the back of block.* Note that you should fit all your daily meals - breakfast, lunch and dinner into the hollow.

We can obtain different amounts of energy from different foods. Foods that are rich on fat and/or sugar provide us with the most energy (e.g. sweets, soda, chips). However, such foods are usually low on fibers, vitamins and minerals, therefore we should eat them in small quantities, seldom or not at all. Otherwise, we quickly fulfill our daily energetic intake, but don't get the necessary nutrients. Since our daily intake of food varies, we shouldn't focus on a single day, but rather take into account the medium intake of at least a week.

** Pictures of food are illustrative and may not correspond to the quantities described on the back sides.*



2. Wheel of Sugar

Your task is to guess the amount of sugar in different soft drinks. Spin both the wheels of sugar and drinks, so that your proposed amount of sugar would be on the same level with the drink you chose. Did you guess correctly?

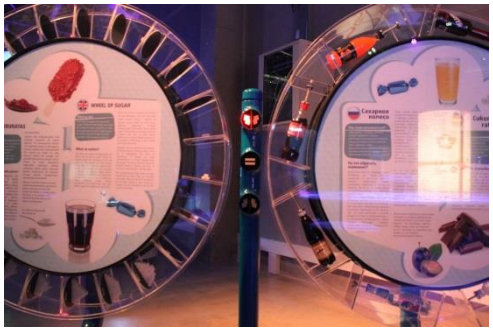
We often talk about avoiding foods and drinks that are rich on sugars. There are natural sugars, for example in fruit and milk, but we should not worry about these. We have to take into account that when carbohydrates should proovide 55-60% of our daily energetic intake, the amount of **added sugar** should not exceed 10%. Extra sugar is added to many different foods during preparation, the foods with the most added sugar are sweets and soft drinks.

When you look at nutrition information on food packages, you can find sugar under several names – glucose or fructose syrup, starch or corn syrup, dextrose (glucose),

fructose. Unfortunately, information about added sugar is often unclear, because the word „sugars“ may refer to both natural sugars (e.g. in juices), added sugars (e.g. in sweets) or both (e.g. in juice drinks, milk-based desserts).

However, you can decide on the amount of added sugar by taking a look at the list of ingredients. The order of ingredients is based on their concentration in a food, starting from the largest. So when sugar (or one of its various forms) is among the first of them, its concentration must be high.

The recommended daily intake of sugar should be no more than 2-4 servings (200 kcal). One serving is for example 2 tsp of sugar, honey or jam, 10-15 g of cookies, 10 g of chocolate or candy, and 1 dl of a soft drink.



3. **Food Fork**

Your task is to guess the energetic value of the foods that are on the prongs of a fork. To do so, move the models either up or down. Numbers on prongs show your proposed energetic value in numbers. When you've made your choice, press the control button to see if you guessed correctly.

Looks like guessing the energetic value of foods is not as easy as it seems. Many foods that are rich on fats, like butter, salad dressings, cheese and pastry, provide a lot of energy even in small doses. Since small doses don't usually relieve the feeling of hunger, it is easy to eat too much – and too many kilocalories. Additionally, portions of food sold in shops and restaurants have become bigger in recent decades, which means that people have got used to eating more than they really need. Researchers have shown that people tend to eat as much food as they are given. So, in order to keep better track or recommended doses, it is wise to use smaller plates and forks.

4. How much energy do I spend?

Your task is to spend the amount of calories that corresponds to the energetic value of a certain food, by using one of the three training devices. There is a table with five different foods next to each device. Make your choice and get started! As you train, the energy level is slowly starting to drop. Check your watch or cellphone to see how much time it takes to burn the required kilocalories. Will you be able to cycle fast enough to burn off the amount of energy you would get from a hamburger.

First and foremost, people need energy for their general functioning (metabolism, breathing, growing), generating heat and everyday physical and mental functioning (working, studying, household chores etc). Physical activity is the best way to regulate the amount of energy spent. A person who weighs 60 kilos and rides a bicycle at the speed of 9 km/h, burns about 200 kcal, the energetic value roughly corresponding to four 10-gram chocolate candies.

2. FOOD PRODUCTION

5. Aha, Food Store

Your task is to go shopping and buy only the food that you don't have at home. First, step to the fridge, choose your preferred language and follow instructions on the screen. When you're finished, take a shopping cart and enter the store. Do you remeber what you need to buy? When you're done with shopping, go to the check-out counter to see how successful your shopping trip was. Are you a conscious buyer or do you tend to waste food?

Food waste is a global problem. Every year, millions of tons of unconsumed food end up in landfills. On the other hand, there are over 850 million people who are starving. Did you know that when you decide not to eat half a loaf of bread and throw it away, the environmental impact of the other half will be 50% higher? Our eating and shopping habits have a quite big impact on environment, therefore it is important to plan your shopping in advance, to reduce the risk of food being wasted.



6. Life Cycle of Ketchup

This game shows you the environmental impact of consuming one kilogram of ketchup (that is sold in a plastic bottle). You have to pass 11 stages from growing tomatoes to the consumption of ketchup. At some point, you need to decide how to continue the process and make choices. Find out what kind of environmental impact you make with your choices!

Life cycle describes the activities and processes throughout all the stages of producing something (like ketchup) - from manufacturing to use to disposal. Every action has an impact on environment. To evaluate the environmental impact of a product, for example ketchup, all the stages of its life cycle are identified and data will be collected on resource use and waste. This data is then used to create a product system model. This is a method of environmental decision-making that is relatively unknown in Estonia, but widely used elsewhere in the world.

** Game is based on life cycle assessments of ketchup, published in science magazines. This model is simplified to show the main idea of life cycles.*

3. BALTIC SEA ENVIRONMENT

7. Ageing of Baltic Sea and Stages of Eutrophication

Water bodies (such as seas) are living organisms and they get older too. This process is called eutrophication. Eutrophication is caused by excessive plant growth and a subsequent decomposition process, which causes oxygen deficiency and decrease in the quality of water, having negative impact on the living environment of fish and other aquatic animals. The speed of eutrophication (or excessive plant growth) depends on several environmental factors.

You can easily tell how severe eutrophication is by simply looking at water. Eutrophication is weak (or doesn't exist at all), when water is transparent (there is little phytoplankton in it). Aquatic plants, like bladderwrack are healthy (not covered in *Ulothrix*, a type of green algae). The most common demersal species (i.e. those who live and feed near the bottom of the sea) are *Monoporeia affinis*, a small amphipod, and the Baltic clam (*Macoma balthica*). The most common demersal fish are species that are dependent on oxygen concentration and low water temperature, such as salmon, brown trout, *Coregonus lavaretus* and cod. Increase in eutrophication level results in oxygen deficiency in the demersal zone, especially in summer and autumn. The seafloor becomes more silted (muddier) and population diversity decreases. The proportion of *Cyprinidae* among fish increases and the proportion of salmonids decreases. High eutrophication means that the oxygen deficiency in demersal zone will be permanent. The seafloor becomes more silted and population diversity is low. Animals cannot live in the areas without oxygen. Transparency of water decreases because of algal blooms and aquatic plants are covered in *Ulothrix*, which impairs their growth.



8. World Through Fish Goggles

Put on the fish goggles and experience what it feels like to "swim" underwater - like a real Baltic Sea fish! Careful, you are not alone here! Can you avoid bumping into others and get to the end sucessfully?

Fish can see pretty well and most of them see colors too. The only exception are deep sea fish who don't need color vision. Deep in the ocean (deeper than 1000

metres), it's pitch dark and only bioluminescent creatures are visible. The eyes of fish resemble those of mammals and birds, but the lenses of fish's eyes are a lot more spherical. Fish see well in water, but in air, their vision is blurred, because the refractive indices of water and air are different from each other. When humans can adjust focus by thickening or flattening their lenses (the lens itself always stays in the same place), eye of fish works like camera lens - it moves the lens closer to the retina, or away from it. Eyes of some fish (especially those who live in muddy water, like common bream) shine when light falls on them. This is caused by *tapetum lucidum*, a layer of tissue in the eye that reflects light back. The light that travels through retina is reflected back again - this enhances their visual sensitivity greatly. Many wild animals have that layer in their eyes as well.



9. **<u>The Fishing Game</u>**

This game shows you, in a simple way, how the choices you make during fishing can change the climate (global warming) and eutrophication. You get points from the choices you make during the game. More points means bigger (more negative) impact on the environment!*

On eutrophication scale, you can earn -2 to +2 points:

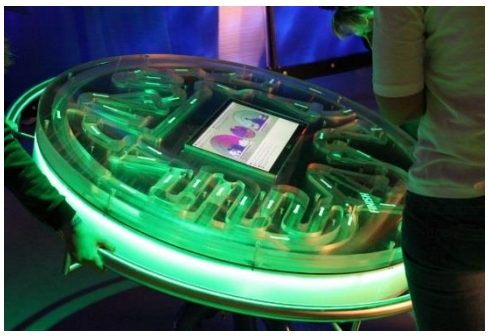
- -2 / reduces eutrophication a lot
- -1 / reduces eutrophication a bit
- 0 / has no effect on eutrophication
- 1 / increases eutrophication a bit
- 2 / increases eutrophication a lot

On global warming scale, we take into account the use of energy and CO2 emission. You can earn 0 to 5 points:

- 0 / no impact
- 1 / very little impact
- 2/ little impact
- 3 / medium impact
- 4 / big impact
- 5 / very big impact

** Information on waste and energy use comes from earlier studies on life cycle assessment conducted by MTT and SYKE and public databases (like Ecoinvent and LIPASTO). Most of studied emissions were N and P emissions in water bodies (cause eutrophication) and N2O, CH4 and CO2 emissions in atmosphere (cause climate changes).*





10. Fish are not „mute“

Your task is to search the hall for different locations where you can hear fish sounds! Water is perfectly suitable for communicating with sound - sound travels in water about five times faster as it does in the air, and sound attenuation (i.e. gradual disappearance) is much weaker in water. We can't hear the sounds in water. When sound travels from water to air (or vice versa), it loses almost all of its energy (99,9%).

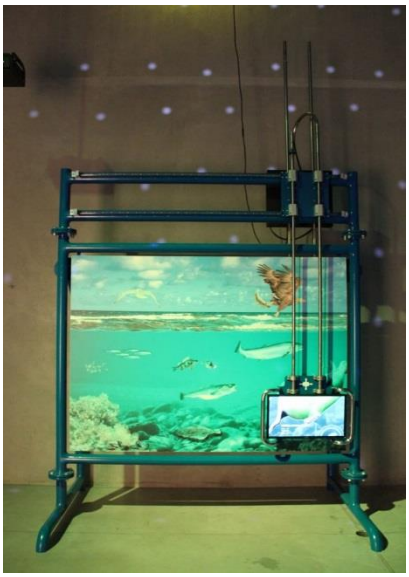
Fish make sounds by rubbing their fins, bones or teeth; using their mouths, or by drumming against their swim bladders, using special sonic muscles. Fish hear sounds with their inner ears, unlike mammals, they don't have any external or middle ears. In order to hear well, fish need the gases inside them. It's usually swim bladder, mostly filled with oxygen, that provides a suitable gaseous environment. Many fish (like European flounders and sharks) don't have swim bladders and they have a very bad sense of hearing. Fish who hear really well have swim bladders that are connected to their inner ears by either a "chain" of small bones (e.g. common carp and other Cyprinidae), or by a narrow air capillary (e.g. Atlantic herring and other Clupeidae). Fish mostly use sounds to communicate with other fish of the same species, to attract potential mates, or scaring off their rivals from spawning grounds. Noise pollution caused by humans (for example blasting or pile-driving works) may disturb or even damage the sense of hearing in fish. In extreme cases, swim bladders may burst, causing the fish to die.

11. Contaminants in Fish (Tomograph)

Toxic substance that are lipid soluble, like dioxins, PCBs, DDT, mostly accumulate in certain fattier tissues of fish. These include skin, red muscles along the side and fattier parts of abdominal area. Livers of some fish (like cod and burbot) are also very fatty and toxic substances may be deposited there as well. Heavy metals, such as mercury, arsenic and lead, have been found in all tissues of fish.

Most toxic substances enter fish through their gills. Although the amount of contaminants released to Baltic Sea has decreased, in many parts of the sea, the dioxin concentration in Baltic herring and salmon is still higher than EU maximum limit. Dioxin concentration in Baltic herring depends mostly on the age of fish, increasing many times during the first 1-5 years of their lives. In this region, Baltic herring won't reach the maximum limit (4 pg/g per wet weight) before five years, that is not before their length reaches 16-17 cm. Fortunately, five-year-old and older fish are relatively rare among the fish caught here.

In general, fish as food are considered useful, so we shouldn't stop eating them altogether. Fish are a valuable source of omega-3 fatty acids and eating oily fish is especially good for cardiovascular system. It is recommended to take into account the maximum limits, in order to reduce possible health risks. You should prefer fish that are younger and differ in their fat content. Fish that are low (e.g. European perch, zander, pike) and medium (e.g. European flounder, Baltic herring) on fat, should be eaten up tp 900 grams in a week. The amount of oily fish (e.g. European eel, brown trout, European sprat) eaten should not exceed 300 grams per species in week. An exception should be made for salmon caught from Baltic Sea and European river lamprey), that should not be eaten more than twice a month. There are recommended maximum limits for canned fish as well – 360 grams a week for smoked European sprat and 480 grams a week for spiced European sprat.



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