Topic based resource

What is the cost of Sugar?

Eco-Schools
Eco-Sgolion

Ariennir gan
Lywodraeth Cymru
Funded by
Welsh Government

2 ZERO HUNGER

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

15 LIFE ON LAND

cadwch keep
gymru'n wales
daclus tidy

Background Information

We are all linked in some way to people in other parts of the world; through the products we buy, the food we eat, what we wear or watch on television, people we know or places we go on holiday. As Martin Luther King famously said, "By the time you've eaten breakfast you've depended on half the world." We often don't even think about these links and the people who grow our tea or make the laces for our trainers, but increasingly the actions we take have an impact on people in other parts of the world.

The world appears to be getting smaller and smaller, yet there are still huge imbalances between nations and people within those nations. It is important that we are aware of these imbalances and also the part we play in them by demanding fast food, or buying the latest trainers. Every day there are pictures on television of developing countries, often showing negative images of hunger, poverty and war. More than a billion people live on less than a dollar a day and lack the basic needs for a healthy life. However, this is not the case for everybody in the developing world. We should present a balanced view, avoid stereotyping, and also remember that people in developing countries are real people, with thoughts, feelings, families and hobbies not unlike our own. Many people are aware of unfairness in the world, but feel powerless to take any action, feel they could make no difference, or that it isn't up to them. A good global citizen knows and understands issues and how to help make a difference.

Many countries in the developing world owe money to rich countries and, unbelievably, spend more on repaying these debts than on meeting the needs of their people. One of the consequences of this is that not enough money is spent on health, schooling, clean water and sanitation. The world rules of international trade tend to favour rich countries, who often pay their farmers subsidies to export food, which appears in markets of developing countries at lower prices than their own, locally grown produce. These same rules prevent developing countries paying subsidies to their own farmers. High import taxes are charged on goods coming into rich countries, which means many poor countries can only afford to sell raw materials. These give far lower returns.

Pupils need to learn about where they fit into the world they live in. They need to develop skills to enable them to participate fully in society at a local, national and international level. Global Citizenship in school involves learning about the way the world works, our inter-connectedness and exploring and accepting similarities and differences between our own lives and those of others. This can help develop pupils who not only want to do something, but feel they can make a difference, however small, and not just now, but for the rest of their lives.

Climate Perspective:

The impacts of climate change are having a disproportionate effect on less economically developed countries across the world, whose populations are less equipped to deal with the fallouts of flooding, storm damage and droughts, which are becoming more intense and severe due to the changing climate. A greater understanding of the issues will motivate communities throughout the world to pull together to tackle the issues contributing to climate change and to help the less economically developed countries adapt to its impacts, where possible.

Activity

Key stage 2, key stage 3

What's the cost of sugar?

Global Goals:

2 - Zero Hunger
12 - Responsible Consumption and Production
15 - Life on Land

Aim – To raise awareness of the impact sugar has on health and the environment.

Objectives:

- To be able to identify how much sugar is found in some everyday products.
- To understand that producing sugar is a resource intensive activity and what we consume in the UK has an impact elsewhere.
- To be able to make informed decisions about sugar consumption and responsible production.

Resources:

- Paper, pens, pencils for mind mapping
- PowerPoint presentation – the impact of sugar and accompanying teacher notes
- Optional bag of sugar weighing the recommended daily allowance to show how little it is.
- Worksheet 1 - Sugar Matching (this could be completed with products brought from home)
- Worksheet 2 - Sequencing of sugar production
- Worksheet 3 – Sugar alternatives fact sheet

Activity Background Information:

The food sector accounts for around 30% of the world's total energy consumption and a total of 1.3 billion tonnes of food is wasted every year. Producing food uses lots of resources – and sugar is no exception to this. With consumption of sugar going up worldwide year on year it is important that we recognise the impact on both health and the environment.

It is well documented that too much sugar can have a negative effect on our health, and is linked to weight gain and tooth decay along with higher risks of diabetes. Most of the world's sugar derives from sugar cane - a tall bamboo like grass grown in tropical and subtropical climates. A smaller amount comes from sugar beet - a root crop grown in more temperate zones. Globally the cultivation of sugar has led to a loss of natural habitats and the loss of biodiversity. Sugar is a water intensive crop and the mills used to produce sugar produce wastewater, emissions and solid waste that all has an impact on the environment.

While consumption is a part of life and we all love a sweet treat from time to time it is important that we cut down on what we consume and encourage responsible production.

The following activity has been split into 2 sessions.

Activity

Session 1:

1. In groups of 4 or 5 ask pupils to discuss 'what are the problems with consuming too much sugar?' Pupils should mind map their ideas. Ask each group to feedback 1 or 2 of their ideas to the class. You might find that pupils are able to highlight some of the health problems associated with the consumption of sugar but may be less familiar with the environmental consequences of sugar production.
2. Use the PowerPoint presentation 'the impact of sugar' to highlight some of the main problems with consuming sugar. There are teacher notes for each slide included below to support learning.
3. Now is the time for pupils to consider how much sugar can be found in everyday food items. Using Activity sheet 1 – 'sugar matching' ask pupils in their group to match the amount of sugar in a product to the product it came from.
4. Discuss your findings as a class and share the correct answers, were there any surprises?

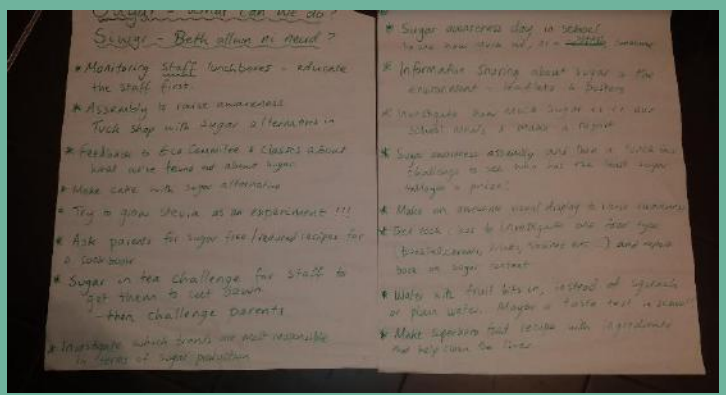
Session 2:

5. How is sugar made? There are a lot of processes that need to take place to get sugar from its raw form to our plate. Watch the following video as a class https://www.youtube.com/watch?v=vCLEYmugfDw
6. Provide each group with a set of cut out cards from worksheet 2 - Sequencing Activity. Ask the pupils to sequence the process of sugar production. If necessary, re-watch the video to reaffirm the process. The important thing here is for pupils to understand just how much energy, water and processing goes into making our sugar.
7. What are the alternatives? Distribute Activity Sheet 3 – 'Sugar Alternatives'. In groups ask pupils to read through the pros and cons of different sugars on the market. Ask each group to share with the class what they think is the best sugar and why.

Extension Ideas:

The sugar matching activity could be completed as a taste test with cereal or any other product, is there a correlation between the food that tastes good and the amount of sugar present?

Ask pupils to think about what we can do with this new information? Are there any changes we could make at home or at school? How else can we help people who grow our food – take a look at Fairtrade sugar, how many products can you find at home that are Fairtrade?



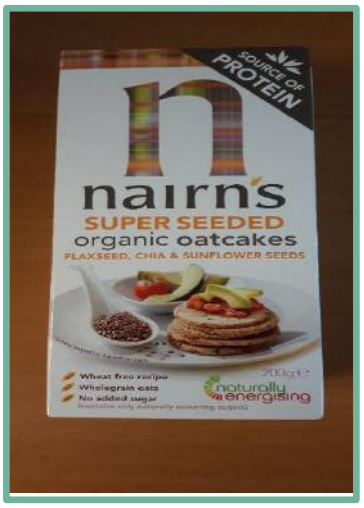
Teacher Notes

These Notes are intended to support the delivery of the PowerPoint presentation 'The impact of sugar'

Slide	Notes
Slide 2	Free sugars are those that have been added to food, those naturally present in honey or syrups or those released by juicing or blending the food (eg fruit is ok as there is fibre in the fruit but juicing the fruit releases the 'Free Sugars') Before sugar enters the bloodstream from the digestive tract, it is broken down into two simple sugars… glucose and fructose. Glucose is found in every living cell on the planet. If we don't get it from the diet, our bodies produce it. Fructose is different. Our bodies do not produce it in any significant amount and there is no physiological need for it. The thing with fructose is that it can only be metabolized by the liver in any significant amounts. This is not a problem if we eat a little bit (such as from fruit) or we just finished an exercise session. In this case, the fructose will be turned into glycogen and stored in the liver until we need it (3). However, if the liver is full of glycogen (much more common), eating a lot of fructose overloads the liver, forcing it to turn the fructose into fat (4). When repeatedly eating large amounts of sugar, this process can lead to fatty liver and all sorts of serious problems (5). Keep in mind that all of this does NOT apply to fruit. It is almost impossible to overeat fructose by eating fruit. There is also massive individual variability here. People who are healthy and active can tolerate more sugar than people who are inactive.
Slide 3	Sugar makes you feel hungry. Emerging research suggests regularly eating too much sugar scrambles your body's ability to tell your brain you're full. Sugary food and drinks are one of the main causes of tooth decay
Slide 4	Regularly drinking sugary drinks = 83% higher risk of developing diabetes, by 2040 it is estimated that 1 in 10 people across the World will have diabetes A child's body needs some sugar to function properly, but dramatic increases in sugar associated with junk food make many children irritable. This is thought to be linked to the spike and following dip in blood sugar levels instead of having a steady supply of energy.
Slide 5	There is an environmental cost to sugar production. Globally land 15 x the size of Wales is used to grow sugar for us to eat.
Slide 6	Sugar is usually grown on huge plantations which tend to be in less economically developed countries (largely due to the climate conditions and the cost of land). Unfortunately, many of the plantations have been 'taken' from the inhabitants in what is called Land Grabs, where local people are kicked off their land without consultation or compensation to make way for the plantations. Land eight times the size of the UK was sold off globally in the last decade, enough to grow food for a billion people, equivalent to the number of people who go hungry in the world each night. More than 60 per cent of investments in agricultural land by foreign investors between 2000 and 2010 were in developing countries with serious hunger problems. However, two-thirds of those investors plan to export everything they produce on that land!
Slide 7	Sugar has arguably had as great an impact on the environment as any other agricultural commodity. Wholesale conversion of habitat on tropical islands and in coastal areas led to significant environmental damage—particularly a loss of biodiversity. Some of the most biodiverse regions on the planet have been cleared for sugarcane production. A dozen countries around the world devote 25 percent or more of all their agricultural land to the production of sugarcane
Slide 8	Sugar mills produce wastewater, emissions and solid waste that impact the environment. The massive quantities of plant matter and sludge washed from mills decompose in freshwater bodies, absorbing all the available oxygen and leading to massive fish kills. In addition, mills release flue gases, soot, ash, ammonia and other substances during processing.
Slide 9	Sugarcane is a water-intensive crop that remains in the soil all year long. As one of the world's thirstiest crops, sugarcane has a significant impact on many environmentally sensitive regions, like the Mekong Delta and the Atlantic Forest.

Worksheet 1 'Sugar Matching'

Can you draw a line and match the amount of sugar in g to the correct product?



0.5g

1.1g

2.8g

6.5g

36.1g

39.4g

Worksheet 1 - Sugar Matching (Answer sheet)

Can you match the amount of sugar to the correct product?

0.5g

1.1g

2.8g

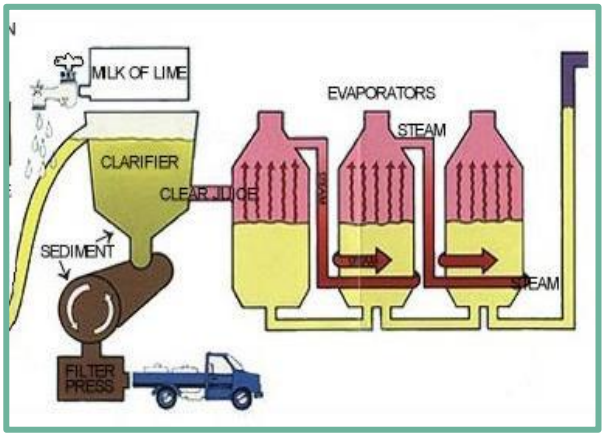
6.5g

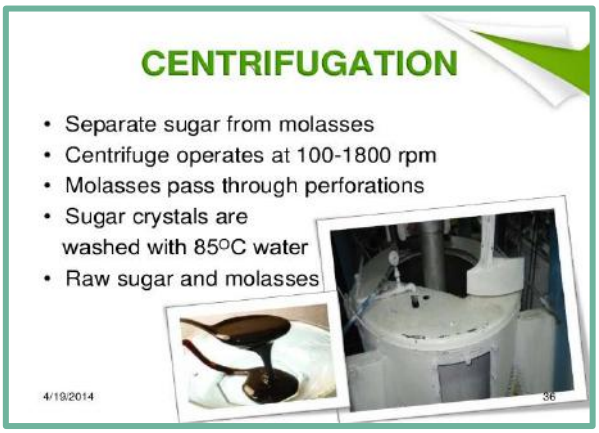
36.1g

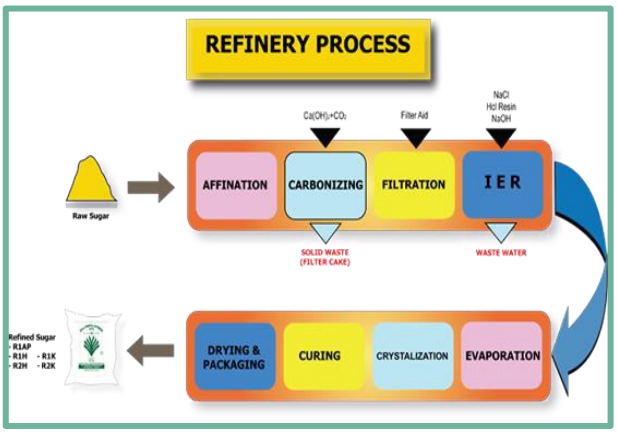
39.4g

Worksheet 2 – Sequencing activity

Each action in the sugar making process should be cut out and the 8 activities sequenced by pupils.







Worksheet 3 - Alternatives to Sugar

Below is just a selection of alternatives to sugar, some synthetic sweeteners, some natural sweeteners. There are many more that you can research further if you wish.

Sugar alternative	What is it?	Good points	Bad points	Impact on environment	Your rating
Aspartame – found in many 'sugar free drinks' as a sweetener.	Fermented soy and corn. 200 times sweeter than sucrose.	Does not lead to immediate weight gain like sugar. Doesn't rot teeth.	92 possible side effects including behaviour disorders and possible cancers, all debated by producers and food standards agency so not proven 100%	Made by fermenting soy and corn (mostly genetically engineered) which are also grown on large plantations.	
Saccharine – another sweetener often found in processed foods	Made from coal-tar it is 200-700 times sweeter than sugar.	Does not lead to weight gain like sugar.	Bitter aftertaste. Linked to bladder cancer in rats. Not recommended for infants or pregnant women and can cause headaches, skin problems, diarrhoea and skin problems.	Made from coal tar which is mined from the ground.	
Honey (raw)	Made by bees – primarily made of sucrose. Some honey is highly processed so loses its benefits. Raw/natural honey is the better option here.	Lots of vitamins, amino acids and antimicrobial properties. Sweeter than sugar so you don't need as much. Supports bee farming. Pollen content can lead to a reduction in hayfever if used regularly.	Still leads to weight gain and teeth problems if too much is consumed.	If local honey is used this supports bee keeping, which is essential to help the decline in bees. Many honeys are so processed that they contain no pollen and some have even been made from sugar!	
Stevia	A herb from native America that is 300 times sweeter than sugar.	No calories and no glycemic index. Been used in Japan for many years with no known side effects.		At present it is sustainably harvested from south America.	

Xylitol	Natural sweetener found in fibres of fruit, vegetables and tree bark. Found in many chewing gums.	Very low glycaemic index and no calories. Can reduce bacteria growth and help with ear infections.	Not digested in stomach but in intestine so can lead to bloating, wind and diarrhoea	Often made from genetically modified products.	
Coconut sugar	Made from the sap of coconut palms. Similar sweetness to table sugar.	Easier to digest than sugar. Lower Glycaemic Index (35) so doesn't cause blood sugar spikes in the same way. Contains potassium, electrolytes and nutrients.	Will still lead to weight gain and impact teeth as it is a 'free sugar'.	Coconut trees grown and the sap harvested (as well as fruit used for lots of other products). Growing quickly in popularity so may lead to larger plantations. Trees grow quickly and can be harvested for sap for 20 years.	
Maple syrup	Made from boiling sap from Maple trees 40 gallons of sap = 1 gallon of syrup.	A more natural sugar with lower Glycaemic Index (about 54). It contains antioxidants	Will still lead to weight gain and impact teeth as it is a 'free sugar'.	Processing involves boiling the sap. Trees can be harvested for many years.	
Sucralose	Another artificial sweetener that is actually derived from sugar using a complex formula	10% the calories of sugar and 600 times sweeter. Can't be absorbed by the body so it passes straight into urine.	Found to reduce good bacteria in the gut. May limit drug absorption for people taking medicinal drugs.	Very highly refined. Because it is excreted in urine it ends up in the oceans. Scientists have found high levels in the Gulf Stream. It is not known what effect it has on ocean life.	

Curriculum Links

Purposes:

- Ethical, informed citizens of Wales and the world.
- Healthy Confident Individuals

AOLE's:

- Humanities

What matters statements:

- Informed, self-aware citizens engage with the challenges and opportunities that face humanity and are able to take considered and ethical action.

AOLE's

- Health and Well Being

What matters statements:

- Our decision making impacts on the quality of our lives and the lives of others.

AOLE's

- Languages, Literacy and Communication

What matters statements:

- Expressing ourselves through languages is key to communication

Resources from other organisations:

- Games from around the world - https://your.caerphilly.gov.uk/sustainablecaerphilly/sites/your.caerphilly.gov.uk.sustainablecaerphilly/files/Final%20version%20Global%20Games%20%5Bweb%20compact%5D%20%282%29%20April%202014.pdf
- Fairtrade Schools - https://schools.fairtrade.org.uk/resources/
- Size of Wales - https://sizeofwales.org.uk/education/education-resources/

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