Sustainable Food

Curriculum Guide

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“Every individual matters. Every individual has a role to play. Every individual makes a difference.”
- Jane Goodall

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Making sustainable food choices is critically important to healthy lifestyles and a healthy planet. Choices include eating locally grown, seasonal produce; following a largely plant-based diet; purchasing organics; and reducing food waste. This curriculum guide highlights four ways we can be more sustainable in our food choices and provides information, activities, resources and action ideas for your students.

Plant-based diet

What is a plant-based diet?

A plant-based diet primarily consists of foods that are naturally derived from plants with limited processing. Little to no food in a plant- based diet is derived from animals.

The "little to no" reference to animal-based foods is interpreted in two ways: Many who eat a plant-based diet do not eat any foods that come from animals, including eggs and dairy (milk, cheese, yogurt, butter). Others interpret plant-based to mean that they eat mostly, but not exclusively, food derived from plants and will consume animal, animal-derived, or somewhat more processed foods on occasion.

Why is a plant-based diet good for you?

A major benefit of plant-based foods is that they contain dietary fiber and phytonutrients that are not found in animal foods. Phytonutrients help protect plants from germs, fungi and bugs can help prevent disease in humans. Plant-based foods are also a source of micronutrients such as calcium, iron, potassium, folate, vitamin A, and vitamin C. The new Health Canada Food Guide released in January 2019 recommends eating plant- based foods regularly to lower the risk of cardiovascular disease and certain types of cancer. Diets rich in fruits, vegetables, whole grains, nuts, and legumes are linked to lower rates of obesity and a decrease in both cholesterol and blood pressure. The risk of type 2 diabetes is also lowered when eating a plant-based diet.

Why is a plant-based diet good for the environment?

Animal agriculture emits 18% of total global greenhouse gases found in the atmosphere (Food and Agriculture Organization of the United Nations, 2006). Animal farming also uses as much as 70% of the world's agricultural lands and approximately 30% of the world's fresh water (Gerbens-Leenes, P.W. et al, 2013). The negative environmental impacts of livestock agriculture includes deforestation and biodiversity loss. Raising animals for food uses 30% of the Earth's land mass (Food and Agriculture Organization of the United Nations, 2006). Imagine if that land could used to grow grain and crops to feed people instead?

Moreover, meat and dairy are not a large or nutritionally efficient part of our diet, as they only provide 18% of our daily calorie requirements and 37% of our protein requirements, yet produce 60% of agriculture's total greenhouse gas emissions (J. Poore & T. Nemecek, 2018). Animal agriculture is also very inefficient. It takes more than 11 times the energy to produce protein from animals compared to grain protein production (D. Pimentel & M. Pimentel, 2003). Beef has the biggest negative effect on the environment. Producing beef requires 28 times more land, six times more fertilizer, and 11 times more water than producing pork or chicken (Eschol et al., 2014). Avoiding and reducing our consumption of meat, particularly beef, and dairy products, is an important way to reduce our environmental footprint.

Why is a plant-based diet good for wildlife?

It might seem odd to think that the food choices we make affect animals in the wild but they do! Research shows that 60% of vertebrate animals have been wiped out since 1970. The leading cause of this decline is deforestation. Animals cannot survive when the ecosystem they depend on is destroyed. Forests around the world are logged and turned into farmland to grow food for people and livestock and to create pastures for livestock to graze. The most extreme deforestation is occurring in Central and South America where animal agriculture is responsible for up to 90% of the destruction of the Amazon rainforest (H. Tabuchi et al., 2017). This is both for grazing cattle and planting soy to feed cows, pigs, and chickens. Eating less meat is a great way to reduce our impact on wild animals, as well as farmed animals.

Classroom activities

Math: Compare the nutrition values of different protein sources — meat versus meat alternatives. For example: One serving of beef has 200 calories, 13 grams of fat, 5 grams of saturated fat, and 19 grams of protein. One serving of black beans has 200 calories, zero fat, 15 grams of protein and 15 grams of fiber. Have students present their findings to the class.

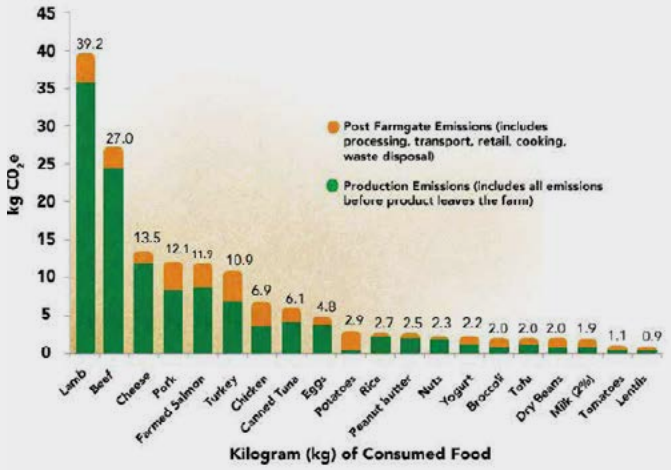
Social Science/Science/Math: Global meat production is at a record high with 58 billion animals raised worldwide each year. Chart and analyze meat and animal products production of 2 countries on each continent. Compare and contrast meat production across the world, where is it increasing or decreasing?

Science: In ecology, with each movement up a food chain only 10% of the original energy is maintained — the other 90% goes to the functioning of the organism. For example, when a rabbit eats grass, only 10% of the energy in the grass turns into energy in the rabbit's flesh. If a fox eats the rabbit, only 10% of the rabbit becomes energy in the fox, so 1% of the original grass energy is passed on.

Discuss food chains and their ecological importance. Go over the concept of energy maintenance as one moves along a food chain. Why is only 10% of the energy retained? Where does the other 90% go? Ask students to create a food web diagram for an ecosystem (e.g. a forest or wetland). Then ask them to make a food web for people. What do we eat? Only meat? Only plants? Both?

Actions students can take

- Encourage meatless Mondays — students will quickly discover what a range of plant-based meal options there are
- Check out dairy alternatives, like soy and almond milk or coconut milk non-dairy ice cream



Additional Resources

Dr. Goodall on why she became a vegetarian: http://bit.ly/janevegetarian

Article in the Guardian: Humanity has wiped out 60% of animal populations since 1970, report finds http://bit.ly/humansimpactanimals

Choosing local seasonal foods

What are local food choices?

Local food can be understood as food produced in Canada. It can also be defined as food produced within a 100 km radius from the consumer. Generally, eating locally means eating food grown close to where you live.

What are seasonal foods?

Seasonal foods are foods that are grown in your area during a certain time of year. In most places in Canada, the growing season is from spring to fall.

Some seasonal food examples:

- Spring: asparagus, rhubarb, peas, zucchini
- Summer: strawberries, raspberries, cherries, tomatoes, corn, peaches
- Fall: squash, pumpkins, potatoes, apples, beets, carrots

Why eat locally and seasonally?

By eating food that is produced close to where we live we reduce the energy required to transport food long distances. A lot of items found in our supermarkets travelled from places that are far away, which contributes significantly to carbon emissions. By choosing food grown locally and in season we can reduce our carbon footprint and support local farmers. Local and in-season produce also tastes better as it is picked closer to when it is ripe and ready to eat with a shorter travel time from farm to table.

Actions students can take

- Visit a farmers' market in your community to see all the different fruits and vegetables growing nearby and how many options there are to purchase local food.
- Start a school yard garden to grow your own food for your community and learn about seasonal fruits and vegetables in your area.

Classroom activities

Math: Select three different size pumpkins and ask the students to guess how many seeds are in each. Then have students count the seeds by twos, fives and tens and see if their estimates were close.

Social Science/Math: Ask your students to research five foods they eat regularly and where it comes from. Calculate the distance it took for all that food to reach the consumer. Students can place thumb tacks on a map of Canada and on a map of the world to show where their food was grown or raised. Ask students to discuss ways they could reduce the carbon footprint of their food choices. What foods could they buy closer to home? Would they give up any foods that come from far away? What food is not available in Canada that we need to import? What are the barriers to eating locally all year?

Additional Resources

Article by Capital News about eating local or imported produce in Ottawa: http://bit.ly/localorimported

Organic Food

What is organic food?

Organic food is produced without the use of pesticides. Organic farmers emphasize the use of renewable energy resources and conservation of soil and water to ensure the sustainability of the farmed landscape. Organic standards are based on six general principles (Canada General Standards Board-32.310, 2011):

1. Protect the environment, minimize soil degradation and erosion, decrease pollution, optimize biological productivity and promote a sound state of health.

2. Maintain long-term soil fertility by optimizing conditions for biological activity within the soil.

3. Maintain biological diversity within the system.

4. Recycle materials and resources to the greatest extent possible within the enterprise.

5. Prepare organic products, emphasizing careful processing, and handling methods in order to maintain the organic integrity and vital qualities of the products at all stages of production.

6. Rely on renewable resources.

Actions students can take

- Try to buy organic produce on the "dirty dozen" list, as they have the highest levels of pesticides: http://bit.ly/dirtydozenfood
- Run a campaign at your school to raise awareness about organic food.

Why eat organic food?

Because organic food is not sprayed with pesticides, we are not ingesting potentially toxic chemicals in our food. Organic food is better for the environment as farmers use farming techniques that minimize ecological impact and can even improve soil conditions. For example, organic farmers will use crop rotation to keep the soil healthy and reduce weeds rather than harsh pesticides and herbicides which can damage the soil and the surrounding environment. Chemical fertilizers help plants grow faster by plumping them with water. While water is important, it reduces a plant's nutritional value. This is one reason why the nutritional values of foods have dropped in the last 60 or so years.

Organic farming methods can be used around the world to feed everyone. "To feed 9 billion people in 2050, we urgently need to adopt the most efficient farming techniques available," says Olivier De Schutter, the UN Special Rapporteur on the Right to Food (De Schutter, 2010). According to the report, agroecological farming methods that do not rely on chemical fertilizers produce bigger yields than farming with chemicals. Without the use of chemicals, the soil is more productive. By keeping the environment intact and increasing biodiversity, farmers can maintain a healthy balance of predators and pests to protect crops naturally.

Classroom activities

Social Science/Math: Ask students to research the effects of pesticides and herbicides on the environment and the difference between organically versus conventionally farmed fruits, vegetables and grains. Compare the costs of organic and conventional produce at your local grocery store. Are the costs that much more? If so, do the benefits to the environment and our health outweigh the increased price? How can we help reduce the price of organics so that they are available to people at all economic levels? How do supply and demand play a role in valuing organic produce?

Additional Resources

Video: Exposure to Pesticides in Produce with Dr. Alex Lu, Harvard on exposure to pesticides and the benefits of organic food for children: http://bit.ly/exposuretopesticides

Ted Talk: Why is organic food so expensive?? By Ali Partovi http://bit.ly/expensiveorganics

Reduce food waste

What is food waste?

Food waste is one of the most significant issues when it comes to environmental concerns and food — although many people are unaware of how big a problem it is.

A recent report co-authored by Second Harvest and Martin Gooche (2019) found that 58% of all food produced in Canada is wasted or lost, which equals 35.5 million tonnes. The report also found that the food industry itself is responsible for as much as 86% of the food wasted. Consumers also play a role, contributing 14% to the amount of food wasted each year.

Food is considered lost when it is spilled or spoiled before reaching its final destination. Not only does that waste have an economic cost — a previous study by Martin Gooch (2010) has pegged it at about $30 billion — it also contributes to climate change. According to the Second Harvest report, food waste releases the equivalent of 56.5 million tonnes

of CO2 emissions annually. As food decomposes in landfill sites, it generates methane, a greenhouse gas with 23 times the global warming potential of carbon dioxide. When we throw away food, we also waste all the resources (water, energy, land) that went into making that food. There are many changes we can make to reduce our own food waste, including meal planning, buying only what we need and composting.

A significant amount of food is thrown out before people can buy it because the fruit or vegetable is not "perfect" enough for consumers. By changing our perception about what food should look like, we can avoid wasting perfectly edible food. Grocery stores also need to reconsider their shape and size requirements for example, many stores will only buy bananas that are free from malformation or abnormal curvature, but some grocery store chains are changing their practices. Loblaw's, for instance, has started selling "perfectly imperfect" produce at a reduced price at their No Frills stores. Collectively, we can harness our power as consumers to ask grocery stores about their food waste policy, and shop at places that are committed to minimizing waste.

Actions students can take

- Compost your food waste, at home and at school, putting the nutrients of the food back into the soil to grow more food.
- Eat leftovers for lunch instead of throwing them out.
- Help your parents plan out meals for the week, create a shopping list and only buy what you need.

Classroom activities

Social Science/Math: Ask students to reflect on the last three days and recall any time they threw out food. What was the food? How much was thrown out? Why did they throw it out? Then have them brainstorm ways they can reduce their food waste.

Math/Social Science: Ask students to conduct a food waste audit of the school. For more details, follow this link to EPA Student Food Waste Audit Guide http://bit.ly/studentfoodwasteaudit

Science: Create a worm composter for your class and use it to teach the nutrient cycle. Discuss why decomposers, like worms, are so important in the environment and how they help recycle the nutrients from dead trees and plants back into the soil. The nutrient-rich soil is perfect for growing new plants and keeping the soil healthy.

Additional Resources

CBC documentary Wasted: The Story of Food Waste — appropriate for middle-high school students: http://bit.ly/WastedDoc

Article: Tackling food waste: Local organization opens community fridges in the GTA: http://bit.ly/tacklingfoodwasteGTA

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