Empowering Eaters to Make Climate Friendly Choices

Carbon Smart Food Guide: A Public Education Initiative

Agricultral Sciences 450: UBC Food Security Project

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ABSTRACT

Every year, the UBC Food Security Project (UBCFSP) is undertaken by students of AGSC 450. Students work in groups on a multitude of community-based action research projects regarding food system sustainability in conjunction with UBC partners and collaborators. This year, our group was given the task of UBCFSP-3B: *Changing the Food System to Change the Climate: Empowering eaters to make climate-friendly choices – A public education initiative.* This project is a collaboration between the Centre for Sustainable Food Systems (CSFC) at the UBC Farm and the 100-Mile Diet Society. Our task included creating a "Carbon Smart" food guide and label for consumers within the Vancouver area to easily identify foods with a low environmental impact, along with a website detailing more information. These education materials will be distributed to an estimated 20,000 visitors during the UBC Farm's 2009 market season.

Creating the carbon smart educational materials involved an extensive review of academic literature and relevant websites to provide clarification regarding the environmental impact of various food choices. Our research determined that the most carbon smart food choices are plant-based food which is local, seasonal, organic, and unprocessed. The design of the food label had positive response from the public and was highlighted in the interactive food guide, which gives information and advice about the greenhouse gas (GHG) emissions of commonly consumed food. Our website information provides more detail, including recipes for each season. Our carbon smart educational materials provide cohesive, accurate, and clear information for individuals to reduce their environmental impact.

INTRODUCTION

The University of British Columbia Food Security Project (UBCFSP) is a community-based action research project involving Agricultral Sciences 450 (AGSC 450) students and multiple partners and collaborators. UBCFSP has been in the works since 2001 with a goal in mind of protecting and enhancing the diversity and quality of the ecosystem and improving social equity. Integral parts of food system sustainability include using locally produced, grown and processed foods that are produced by socially and ecologically conscious producers. This year, our group was given the task of UBCFSP-3B: *Changing the Food System to Change the Climate: Empowering eaters to make climate-friendly choices – A public education initiative.* Our goal is to create a "carbon smart" food guide, label, and website for the Vancouver area.

The outline of our report will cover the following: Discussion of the problem definition and how it is connected to the broader food system, group reflections on the UBCFSP Vision Statement, description of our methodology, findings and discussion of our carbon smart educational materials (definition, recommendations, design). We will conclude with recommendations for the teaching team and next year's students to make the project as progressive and successful as possible.

Within our report, we provide information on the types of foods that are carbon smart and ways to eat and live that contribute to the least amount of greenhouse gas emissions (GHG). In educating the public and increasing their awareness of the environmental impact each choice can make, we are hoping to make the move towards a healthier earth a reality.

PROBLEM DEFINITION

With every meal we eat, we have the power to reduce climate change. With food and drink consumption being responsible for over 1/3 of total greenhouse gas emission, drastic measures need to be taken to combat global warming (European Public Health Alliance, 2006). Many papers (Pimentel and Pimentel, 1996; Eshel and Martin, 2006; Garnett, 2008) estimate the amount of GHG emission produced by current food system to be around 20% of all emission on a global scale. Although Environment Canada (2007) indicates that agriculture accounts for only 8% of total emission, it fails to account for off farm activities and other components of the food system, such as transport, processing, storage and food preparation. As a result, when all aspects of food production are taken into consideration, the environment is dealing with an even greater GHG emission than previously indicated. Nowadays, the average North American meal travels 2,500km before it reaches consumers and contains ingredients from five countries on top of our own (Get Local, 2009). The fact that food production in other countries, such as China, may be more cost effective than producing the foods locally further contributes to food miles. Because of this, transportation of food including air, land and sea, now accounts for 11% of total GHG emission with increasing reliance on the most polluting methods—airplanes and trucks (Rauber, 2009).

Along with these findings, the UBC Farm Center for Sustainable Food System (CSFS) and the 100-Mile Diet Society initiated "Changing the Food System to Change the Climate" project. Through this collaborative project, it is their hope to raise awareness of this 'food mile' issue and hopefully impact the food system by empowering

others with the knowledge and skill of how to make climate-friendly food choices (Agsc, 2009).

Scenario 3b concentrates on off-farm activities, such as transport, processing, storage and food preparation that account for about half of all GHG emission in the current food system (Heller and Keoleian, 2003). It deems that both individual's decision to eat local and unprocessed foods, as well as conducting a more environmentally-friendly lifestyle could significantly reduce self GHG emission and produce a positive impact on climate change (Agsc, 2009).

Nowadays, consumers are faced with countless advices about how to eat healthy, and now with additional concerns about climate change and environment protection, there is an increased anxiety and confusion revolving what to eat among consumers. The main objective of "Changing the Food System to Change the Climate" project is to educate the public on this issue. By creating this easy to read, interactive food guide, we can educate consumers on how to identify low-impact, carbon smart foods, as well as helpful lifestyle tips on how to reduce personal GHG emission. Through this food guide and other public education materials, we hope to raise awareness of the problem and present simple ways for consumers to make an impact. Furthermore, we want to create a safe environment for consumers to learn about carbon smart foods, food miles and how to help combat climate change.

While the number one problem with regards to the food system is climate change (from GHG emissions), food security and sustainability are also major problems that need to be addressed. Food security, as defined by the Food and Agriculture Organization of the United Nations (2007), means "when all people, at all times, have physical, social

and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life". The major points to emphasize would be "availability, accessibility, affordability, and being culturally and environmentally appropriate" (Foodshed Project, 2009). By educating the public about carbon smart food choices, such as vegetables and legumes from the UBC farm or local produce markets, consumers can understand the importance in opting for a more plant-based diet. Choosing local, plant based foods helps cut out the excess fees associated with the harvesting, processing and importing, which already cost more than our average in-season produce. Studies show that a vegetarian diet compared to a traditional diet that includes meat reduces costs by 20% and can save an estimated $4000 a year (NVW; Dworkin, 1999). Consumer health is improved by eliminating 50% of saturated fats that come from meats, and providing a high number of antioxidants and cancer-preventing nutrients (NVW; Dworkin, 1999). The carbon smart food guide provides a variety of low-carbon food choices locally and during the different seasons. Consumers can then choose from these varieties that ensure them an affordable, accessible, and healthy diet.

In terms of sustainability, the carbon smart food guide addresses the preference for local in-season products, instead of imported goods sold in supermarkets. As the global population increases, the demand for food increases as well. However, the agricultural practices that have developed over time to keep up with consumer demands have been both damaging to the environment and to consumer health. Studies show, direct emissions from agriculture grew by 27% between 1970 and 1990, while 22% of current GHG emissions come from agriculture (IPCC; McMichael, Powles, Bulter, &

Uauy, 2007). These agricultural practices include land deforestation for grazing and feed production and from the use of nitrogenous fertilizers and input from animal by-products (McMichael et al., 2007). A traditional meat diet clears 12 times more land than is required to support a vegetarian diet (NVW; Dworkin, 1999). Land deforestation not only eliminates the trees that help balance and restore the carbon cycle, it destroys animal and plant habitats as well; thus disrupting the ecosystem. Statistics shows that 72% of total US grain produced is fed to animals raised for slaughter and that it takes 15 pounds of feed to get one pound of meat (Dworkin, 1999). However, if these grain products were used for direct human consumption, there would be enough to feed the entire planet (Dworkin, 1999). In addition, using land for animal agriculture is inefficient in terms of maximizing food production. One acre of land can produce 50,000 pounds of tomatoes, 40,000 pounds of potatoes, 30,000 pounds of carrots or just 250 pounds of beef (OTB, 2002).The use of fertilizers and concentrated amounts of animal by-products often leave the land non-arable. Over-harvesting of the land leads to the same result since the land is unable to fully replenish itself. In short, these industrial practices provide short-term benefits but leave long-term damages. By emphasizing local farms and small-scale farming practices, sustainable use of the land can be assured. By growing different crops every season (crop rotation), the land is able to replenish and balance out nutrients to allow for prolonged usage.

The UBCFSP provides initiation for change from a variety of directions. Each scenario aims to make the UBC campus a more sustainable and carbon friendly place. By targeting different aspects of campus, from the farm itself to the students and staff, people are both encouraged and motivated to take UBC a step closer to being carbon neutral.

Scenario3b does so through education. Of the six scenarios, five of them are targeted at changing the campus physically to allow for a more carbon smart lifestyle and way of operation. By incorporating more UBC grown produce into campus food outlet menus and expanding the UBC campus productivity and sustainability through rooftop/community gardens and improving the UBC farm. Scenario 3b connects all these components together by educating campus consumers about the importance and purpose of these initiatives, and what differences it can make in terms of carbon emissions.

VISION STATEMENT REFLECTION

Our group agrees with the Vision Statement for a Sustainable UBC Food System because it highlights the importance of both the ecological environment and the social one. The Carbon Smart Food Guide is one way of bringing this vision statement into reality. The only flaw in this vision is in relation to economic and government policy barriers that will be faced in its implementation.

Our project involves designing a Carbon Smart Food Guide. The purpose of this food guide is to help consumers make choices that lower our environmental impact. The vision statement supports our food guide as it supports locally produced and processed food, local recycling and composting of waste and production of food by producers that not only support our social and ecological environment but also believe in that vision.

Additionally, since we are working with the UBC Farm it is important that the vision statement supports their values. Points four, six and seven all support the UBC Farm. They are producers who are socially and ecologically conscious that work to promote awareness among consumers about the food system and in return should be able

to provide consumers with fair prices and receive fair prices in return. This promotes the creation of a food community and socially and ecologically aware consumers. Furthermore, this vision statement supports principles that we have been taught about food security. Throughout its implementation, it will help consumers receive food that is affordable, accessible, available, appropriate, sustainable and safe.

METHODOLOGY

The focus of our project was to come up with a clear and concise food guide, label and a website that would raise awareness for the need to reduce GHG emissions by consuming a low carbon diet (being carbon smart) and methods that can be implemented to do this. The target of our scenario was the general public that includes students and staff on campus as well as food services operated both by AMS and UBC. In order to complete the food guide, label and the website, we used a number of methods to determine what is known about GHG emissions, a low carbon diet and what needs to be emphasized.

Web Based Research

We began our investigations by reviewing scientific literature, reliable websites and online data. The rationale for doing this was to get a basic idea of what information was available on greenhouse gases and the low carbon diet, what ideas have been implemented successfully and what hasn't. In addition, when we first started the project we were unclear as to what a low carbon diet and being carbon smart meant and conducting online research helped to clarify that. Scientific literature also assisted us in knowing what food groups emitted more GHG than others and this gave us an idea on how to create the food guide and label. For instance, through research we learnt that meat

consumption contributes more to global GHG production than plant based proteins (McMichael, Powles, Butler and Uauy, 2007). As our project was based on reducing food miles, a big part of our research also focused on foods that are produced locally and seasonally in Vancouver. For this, we looked at websites such as the UBC farm, the 100 mile diet, and the Canadian Association of Grain Producers. After a literature review, group discussion produced many ideas on how to categorize different foods according to the number of food miles. In the end, we divided them into six groups for the food guide: Processed Foods; Red Meat and Dairy; Poultry and Eggs; Seafood; Fruits, Vegetables and Grains; Legume, Nuts and Seeds.

Feedback from Stakeholder and Group Discussion

Communication was facilitated through questions asked during class time with projects stakeholders such as the UBC farm team. As mentioned below, we had a number of samples for the food label which we discussed with Mark Bomford, the program coordinator for the Centre for Sustainable Food Systems at UBC Farm, who gave us some input on what the label should portray. Our teaching assistant, Amy Frye, who is also the marketing coordinator for the UBC farm gave us feedback regularly by answering any questions that we had about the project. Furthermore, on an ongoing basis the group continued to share ideas in order to improve and move forward with the project. For example, ideas on how to format the website, food guide and label was discussed during class hours and through email.

FINDINGS AND DISCUSSIONS

Carbon Smart Definition

Our group defined “carbon smart” as making choices that would reduce the amount of GHG emissions, which would, in turn, contribute to a lower environmental impact (refer to Appendix C). As our project specifically focused on the food system, being carbon smart meant making personal food choices that contribute to less GHG emissions. We came to this definition from our research described in detail in the methodology section. For example, we found that choosing local fruits, vegetables, seafood and grains contributes to less GHG production than meat and dairy products. As a group, we were unanimous on the definition of carbon smart since our individual research showed the same definition. However, group discussions produced different opinions on which foods were more carbon smart than others. We therefore, decided to categorize foods into groups based on the amount of GHG produced. For example, foods that produced the same or almost the same amount of GHG were grouped together. This is shown in the food guide and explained in detail in the website.

Food Guide and Website Justification

From our definition of carbon smart food we created several specific recommendations that consumers could follow (refer to Appendix A & C). These highlighted differences between animal-based and plant-based food, between different types of animal-based food, between locality, seasonality, farming and processing and different lifestyle choices.

1. Red Meat and Dairy

Plant-based foods contribute relatively little to GHG production when compared to animal-based foods such as red meat, dairy, eggs, seafood and poultry. It takes 10

times more fossil fuel to create 1 gram of animal protein when compared to 1 gram of plant protein such as beans and grains (Pimental et al., 2004). A person consuming a typical animal-based diet which consists of 70% plant based foods and 30% animal based foods generates about 1.5 metric tonnes of CO_2 more per person per year than if the same person was consuming a plant based diet yielding the same amount of calories (Eshel & Martin, 2006). In terms of scale, this is equivalent to switching from a SUV to a compact car (Eshel & Martin, 2006).

From all these animal-based products, red meat and dairy are the highest contributors to GHG. This includes cows, sheep and goats. Their contribution is so high that reducing consumption of these products would have a greater impact on reducing GHG than reducing one's food miles and buying local (Webber & Matthews, 2008). The integral 2006 report from the Food and Agriculture Organization (FAO) of the United Nations entitled *Livestock's Long Shadow: Environmental Issues and Options* outlined that livestock is responsible for 18% of GHG emissions which is a bigger share than that of transport (Steinfield et al., 2006). Another report stated that it contributes 4.6 to 7.1 billion tons of GHG per year or 15-24% of total GHG emissions (Reijnders & Soret, 2006). Therefore, if meat consumption is necessary, local, organic and grass-fed cattle may be a better choice as it emits 40% less GHG and consume 85% less energy than conventionally produced beef (Koneswaran & Nierenberg, 2008).

Several reasons contribute to this large figure. One, livestock consumes more food than it yields. On average it takes 10 grams of plant protein such as soybean to generate 1 gram of animal protein such as beef (Reijnders & Soret, 2006). It is known that 80% of the world's soybean crop and more than 50% of all corn is fed to the global

livestock population (Koneswaran & Nierenberg, 2008). Livestock also competes for land and water. On a global basis, approximately 56 billion land animals are reared and slaughtered for human consumption and these animals occupy 30% of the earth's entire land surface (FAO, 2008; Steinfield et al., 2006). Not only does livestock take up land it also destroys biologically sensitive terrain. 70% of the former Amazon forest has been cleared for livestock grazing which leads to emission of 2.4 billion metric tons of CO_2 annually as a result of deforestation (Steinfield et al., 2006). Livestock also causes land degradation problems which are difficult to reverse (Pimentel & Pimentel, 2003). Pastures and rangeland soil loss in the United States is around 6 tons/ha/y whereas sustainable rate of soil loss is 1 ton/ha/y (Pimentel & Pimentel, 2003). Therefore, the current rate of soil loss due to livestock is unsustainable especially considering that it takes approximately 500 years to regenerate 1 inch of soil (Pimentel & Pimentel, 2003). Lastly, livestock contributes to 9% of carbon dioxide emissions, 37% of methane emissions and 65% of nitrous oxide emissions (Steinfield et al., 2006). Methane has a global warming effect 23 times greater than carbon dioxide and nitrous oxide has a global warming effect 296 times greater than carbon dioxide (Steinfield et al., 2006).

2. Poultry and Eggs

Since livestock has the highest carbon foot print of all animal products, if one must consume animal products, the best choice is to choose poultry and eggs products more often than red meat (refer to Appendix A & C). These products produce 150% less GHG emissions than red meat (Weber & Matthews, 2008). For example, if you were to switch one day of red meat and dairy to chicken and eggs for a whole year your GHG emissions would be reduced by 252 kg of CO_2 (Weber & Matthews, 2008). Also,

choosing animal products that have been produced in carbon smart methods will also help reduce GHG emissions. Carbon smart practices include choosing local and organic animal products.

3. Seafood

Seafood scores relatively lower in carbon emissions but within this category there are ways to make wiser choices regarding types of seafood and the way we obtain them (refer to Appendix A & C). Choosing local fish means it is fresher, seasonal and does not have to be transported long distances. Method of transport must also be considered. Peter Tyedmers, an assistant professor at Dalhousie University, states that "airfreight is tow order of magnitude greater in terms of emissions than [ocean] container cargo" while scientific studies show that "transporting what we eat accounts for 80 percent of the U.S. food system's GHG emissions" and that the "average American's eating habits account for 2.8 tons of carbon dioxide emissions each year, compared with the 2.2 tons of carbon dioxide the same person generates by driving" (Eilperin, 2008; Tyedmers et al., 2005). Furthermore, one must consider how it is transported to food outlets. Many types of non local, fresh fish are flown by air (Circle of Responsibility, 2007). Even though gross aircraft emissions are less than from shipping, aircrafts emit directly into the atmosphere and therefore cause greater damage (Zhou & Griffiths, 2008). So the best choice is to choose fish that is locally caught by small boats to reduce GHG emissions.

The increasing number of fish farms to combat declining wild fish stocks is another major contributor to carbon emissions and are also damaging to the natural environment. For example, carbon emissions come not only from farm operations and the fish themselves but from the large amount of fish feed that is used (Tyedmers et al.,

2005). Fish feed contributes to 90% of the farmed salmon's carbon footprint (Tyedmers et al., 2005).

Smaller fish species such as sardines, herring and other low trophic seafood such as clam and mussel are considered to be low carbon due to their fishing and farming methods (Circle of Responsibility, 2007). They generally do not require as great of an input from fossil fuels (Circle of Responsibility, 2007). Shellfish are farmed on the coast in floating trays or nets and require little human intervention due to them being able to filter the ocean water directly for food (Circle of Responsibility, 2007). Small fish species also travel mainly in large schools so their yield per trip out to see is much greater and more efficient than tuna fishing methods (Circle of Responsibility, 2007).

Furthermore, one should avoid eating over fished and threatened fish species. Over 50 years ago fishing was secluded to depths of 50 meters. Today fishing covers the entire ocean to depths of over 200 meters. (Zhou & Griffiths, 2008). Over the last centuries, commercial fisheries have depleted the fish population with 52% of fish being fully exploited, 16% being over exploited and 7% being depleted. (Seachoice, 2009). Many fisheries have little understanding of the danger of over fishing and the meaning of sustainability. Consumers are in a powerful position as their demand dictates the supply and if fisheries realize the demand for sustainable fish they will change their practices.

4. Fruits, Vegetables and Grains

Our recommendations also cover carbon smart choices within the category of plant-based foods. Local, seasonal and organic foods are considered to be the most carbon smart (refer to Appendix A & C). The average North American meal "travels 2400 km to get from field to plate and contains ingredients from 5 countries in addition to

our own" (Get Local, 2008). Therefore food transportation accounts for 11% of GHG emissions (Weber & Matthews, 2008). Locally grown fruits, vegetables and grains alleviate the reliance on long distance transport and the need for refrigeration and therefore allow for minimal contribution to global warming and climate change (Weber & Matthews, 2008). Local foods also support local farmers, producers and the economy (Get Local, 2008).

Organic food is considered to be carbon smart because it does not require artificial fertilizers, growth promoting drugs or routine antibiotics (Canadian Organic Growers, 2009). It does not require energy intensive machinery and technology to produce, it maintains biological soil activity and it ensures sustainability and minimizes GHG emissions (Canadian Organic Growers, 2009).

5. Processed Foods

In our industrialized world food choices are not only limited to plant based and animal-based products. These food products are further changed into processed food products. This includes food that is pre-packaged, frozen, canned or modified into products such as cereals, granola bars and deli meats. The general rule is: the greater the amount of modification, the greater the contribution to GHG emissions (Weber & Matthews, 2008). The production phase of food contributes to 83% of the US household contribution of CO2 from its food production foot print (Weber & Matthews, 2008). This is due to the large amount of transportation, storage and cooking involved (Weber & Matthews, 2008). Therefore our recommendation to consumers is to reduce consumption of processed food products to reduce their carbon foot print (refer to Appendix A & C).

6. Carbon Smart Lifestyle

Since our project was to generate a carbon smart food guide and food label the majority of our recommendations are based on food choices but we felt it was important to also highlight carbon smart lifestyle choices in our food guide and on our website (refer to Appendix A & C). Buying food with the intent of minimizing waste has a positive impact on reducing GHG. Food waste leads to emission of methane gas from decomposition of food (Love Food Hate Waste, 2009). By reducing food waste, GHG emissions can be decreased by 15 million tonnes of carbon dioxide equivalents per year (6 Wrap, 2009). Additionally, composting and recycling will have a positive impact (Composting Counsel of Canada, 2009). Choosing to walk, bike or use public transport would also reduce carbon emissions (Pascal & Walter, 2006). Additional tips include being efficient in energy and water usage.

Layout of Guide and Label

The main objective of the food guide is to educate the general public on how to identify low-impact, carbon smart foods. With the public in mind, our group felt that information on the guide should be concise and aim to clear up and ease the confusion revolving climate friendly food choices. The food guide, therefore, is easy to read and presents simple lifestyle tips that help consumers reduce their own GHG emissions (refer to Appendix A). Furthermore, the guide takes the shape of a circle with an interactive middle piece that revolves around the guide and reveals information and tips about these six categories: Fruits, Vegetable and Grain; Legumes, Nuts and Seeds; Seafood; Poultry and Eggs; Red Meat and Dairy; Processed Foods (refer to Appendix A). The colorful, interactive wheel and the easy-to-follow directions will appeal to our target audience—

general public at the UBC Farm. We felt that it was necessary to create a guide that attracts consumers' attention and involves them in the process of discovering the information. The interactive aspect of the guide will allow for longer knowledge retention, and we felt that this was necessary in promoting carbon smart food choices over the long run.

The main objective of the food label is to indicate to consumers that certain food choices produce low GHG emissions and contribute to a lower environmental impact when compared with other food choices. Our group felt that such a label should be designed with simplicity in mind but, at the same time, convey exactly what we want to convey. Therefore, we came up with a label that included the words 'carbon smart' written across the top with a reduced-CO2 symbol right underneath it. We wanted to include the environment in our label and decided on a leaf that rests against the edge of the label. The overall, green color scheme pops against the white background (refer to Appendix B).

In order to construct the food label, we had to keep in mind that it would eventually be put on food items that were considered to be carbon smart and so we had to design a label that would be easy for consumers to understand. We came up with different designs for the labels and conducted an oral survey on campus at the SUB to get students' feedback on what they thought the different labels represented. From the answers we got, we chose the one that they found easiest to understand while effectively portraying the message of a carbon smart food (refer to Appendix B). Once this was done, we further modified the label to make it more eye-catching and appealing.

Food Guide Costs

The carbon smart food guide consists of two 8" circle parts (one double-sided and one single-sided) that are both perforated in the centre and bound by a metal pin. The nature of the circle design demands a special offset printing and has to be die-cut to shape. The stock of the paper has to be quite heavy for the wheel to operate effectively. Vancouver Sharp Imaging (sharpimaging.com) quoted $10, 460.00 for 5000 copies of our food guide on 100lb MOHAWK OPTIONS SMOOTH COVER (100% Post consumer, Processed Chlorine Free FSC Certified Green Seal Certified Made with wind-generated electricity FSC Certification which ensures responsible use of forest resources). This works out to be $2.09 per food guide. We realize that this price is expensive; however, the interactive and colourful interface may make it more appealing to a consumer than a simple brochure.

Website Format

The Carbon Smart website (CarbonSmartBC.com) provides detailed information on the definition of carbon smart, the impact of carbon smart food on the environment, and several tips on how to be carbon smart (refer to Appendix C). The information on the website was collected through research from scientific journals and other credible websites. Casual English language is used on the website, so that consumers can refer to it and easily understand the content. The website will have several tabs on the left side: Home, Climate Change, Food & Climate Change, Evaluating Carbon Smart Foods, Local & Seasonal Foods, Organic Foods, Processed Foods, Carbon Smart Lifestyle, Carbon Smart Recipes, Useful Links, and About Us (refer to Appendix C).

The ***Homepage*** contains the logo and the definition of carbon smart foods. This logo will be widely distributed as a small label on foods that emit low GHG, which will be explained in the 'Evaluating Carbon Smart Foods' section.

Climate Change page explains the impact of GHG in the environment. It gives some examples of the extreme weathers that are currently occurring all over the world as the results of global warming phenomena.

Food and Climate Change page contains explanations on why consumers should choose carbon smart food in terms of its GHG contribution to the environment. The correlation between climate changes and GHG emission from agricultural sector is used to raise awareness and emphasize the importance of choosing carbon smart food.

Evaluating Carbon Smart Foods section includes part of the food guide. The consumers can choose between the different categories on the wheel to find detailed information about certain foods—i.e. Meat and Dairy; Poultry and Eggs; Seafood; Fruits, Vegetables, and Grains; and Legumes, Nuts, and Seeds. Each food category has a ranking based on the amount of total GHG emission. This is used to inform consumers to choose foods with low GHG emission. Additionally, the pages contain current research findings of that particular category and simple tips to be carbon smart in choosing food.

Local and Seasonal Foods section contains information on how to eat locally and

seasonally. The facts about low GHG emissions from local and seasonal foods are utilized to raise consumer awareness. This page also contains “Foodshed Map” from 100 Miles Diet Society which illustrates the availability of local food around Greater Vancouver Areas.

Organic Foods section reminds us the importance of organic farming and provides various methods on how to increase consumption. The advantage of organic foods, including low GHG emissions and health benefits, are hoped to encourage consumers to choose more organic foods in their everyday diet.

Processed Foods section explains why they are harmful to the environment and provide various ways to avoid such items. Consumers are expected to reduce their consumption of processed food due to high GHG emissions.

Carbon Smart Lifestyle, along with carbon smart food, will have a great impact on reducing GHG in the environment. Thus, we decided to educate the consumer about the different ways of life that can support the reduction of carbon footprint. The lifestyle page includes several tips, such as walk or bike, bring your own bag/mug, recycle & compost, use water efficiently, and be energy efficient.

Carbon Smart Recipes pages contain several recipes for each season of the year: spring, summer, autumn, and winter using various seasonal and local foods. These recipes show that the consumers can eat carbon smart food all year around.

Useful Links. Carbon smart websites provide thorough information on how to reduce carbon footprint via food choices. However, if consumers want to know more in-depth information about a particular issue, they can refer to these websites in the useful link page. On this page, several websites, such as ones about global warming, carbon footprint, organic produce… etc, can be found.

About Us. On this page, the information about carbon smart food sponsors can be found. Brief introduction about UBC Farm and 100 Mile Diet along with their websites are available.

RECOMMENDATIONS

Although this project has been a great learning experience and has generally gone pretty well, there are a few suggestions that we have for the teaching team and next year's students. We felt that there was a lack of overall organization of the project and not knowing what groups we were in for sure until a few weeks into the semester was a bit unsettling and distracting. Therefore, we suggest to have that sorted out before the semester begins would save time and avoid confusion. Furthermore, it was frustrating to not have the final outline provided until almost the end of the project. Again this comes down to organization and although we were still able to do most of what was needed, it would have been helpful to have everything laid out from the beginning. Moreover, as there was not much background work from previous years, it was a bit difficult getting started on this project. We were not sure where to start so it would have also been

helpful to have some of the later presentations, with relevant background information, earlier on in the semester rather than later.

For AGSC 450 2010 colleagues we recommend an extensive review of academic research to investigate new findings in the field of personal food choices and their subsequent environmental impact. The GHG emissions of food is a new and popular area of research, thus it is important to keep on top of current findings and changes within the field. An example of new areas of research that would be beneficial to understand could be the knowledge of the most nutritionally optimal plant-based foods with the least amount of environmental impact. Additionally, adding content to the website to include interactive games and activities would provide a fun learning environment and help communicate the vital message of the environmental impact of personal food choices. Lastly, future AGSC 450 colleagues could help to find ways to integrate and expand the carbon smart food guide, label, and website to areas beyond Vancouver such as Vancouver Island and the Okanagan.

CONCLUSION

In a broad sense, the UBC Food System Project pertains not only to the UBC Farm and the UBC campus itself; it extends out to the community, in the hope of bringing consumers together to help reduce GHG emission on a global scale. In our scenario, the carbon smart food guide and the carbon smart food label are intended to raise awareness about the impact of consumer food choices on the environment and the role we can play in fighting GHG crisis that is affecting our environment today. Through this project, we hope to remind consumers the importance of carbon emissions and GHG,

not only from food miles but from how our food is grown and processed. Many people overlook or are unaware of the many components of the food system. The point to stress is that carbon emissions come not only from how many miles we drives to obtain our food or how far our food has travelled before appearing on our dinner plates. Food miles are only half of the story. Agriculture, off-farm activities, transport, processing, storage and food preparation are only a few to be stressed. It is through these overlooked issues that fuel the Food Systems Project in creating a carbon smart food guide and a carbon smart food label. These will help direct consumers in making carbon smart choices and educate the public about the source of GHG emissions.

In summary, changing our food choices can greatly reduce greenhouse gas emissions; which is becoming a major problem with regards to climate change. It is through this project that we hope to educate and disclose the importance of carbon smart foods and the difference we can make through our food choices. By reducing meat consumption and replace with plant-based protein, we can reduce GHG emissions by almost 20% (Steinfield et al., 2006). In turn, replace these high carbon foods with carbon smart local, organic and seasonal produce. Another important factor is to avoid highly processed foods and to reduce our overall waste production. By choosing foods that produce low GHG, we can help lower the impact that the food sector have on the environment. We hope that the carbon smart food guide can be incorporated into our daily lives and be used both on and off campus.

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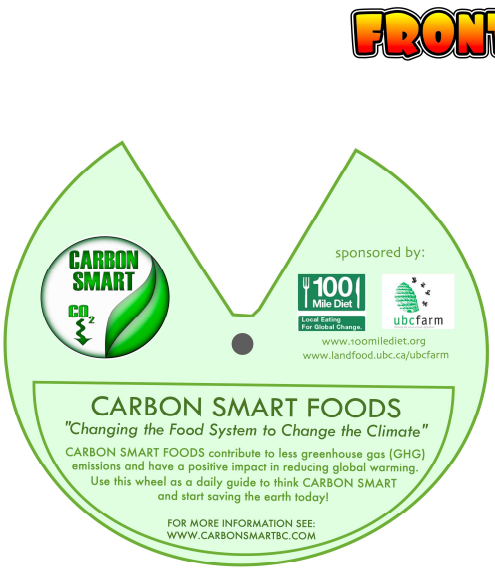
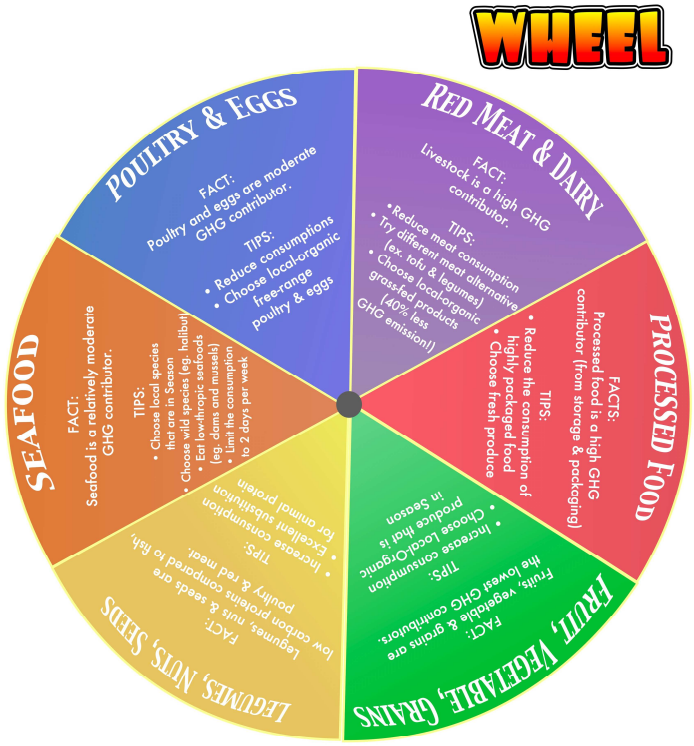
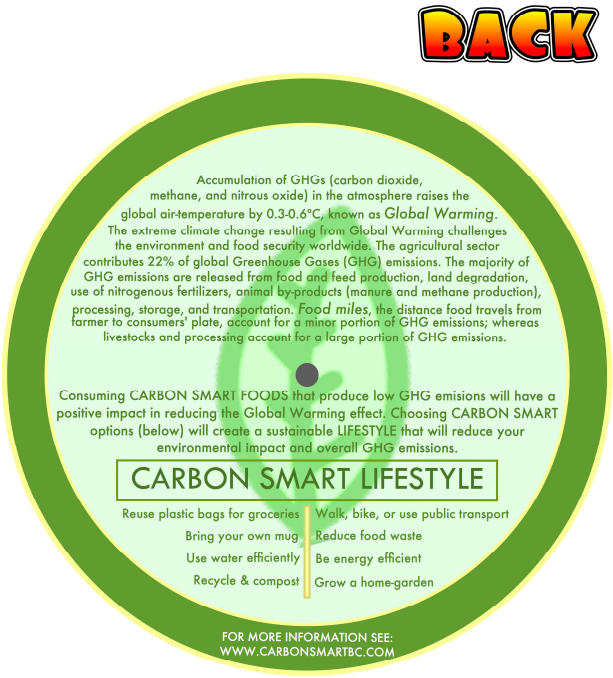
APPENDIX A—Carbon Smart Food Guide

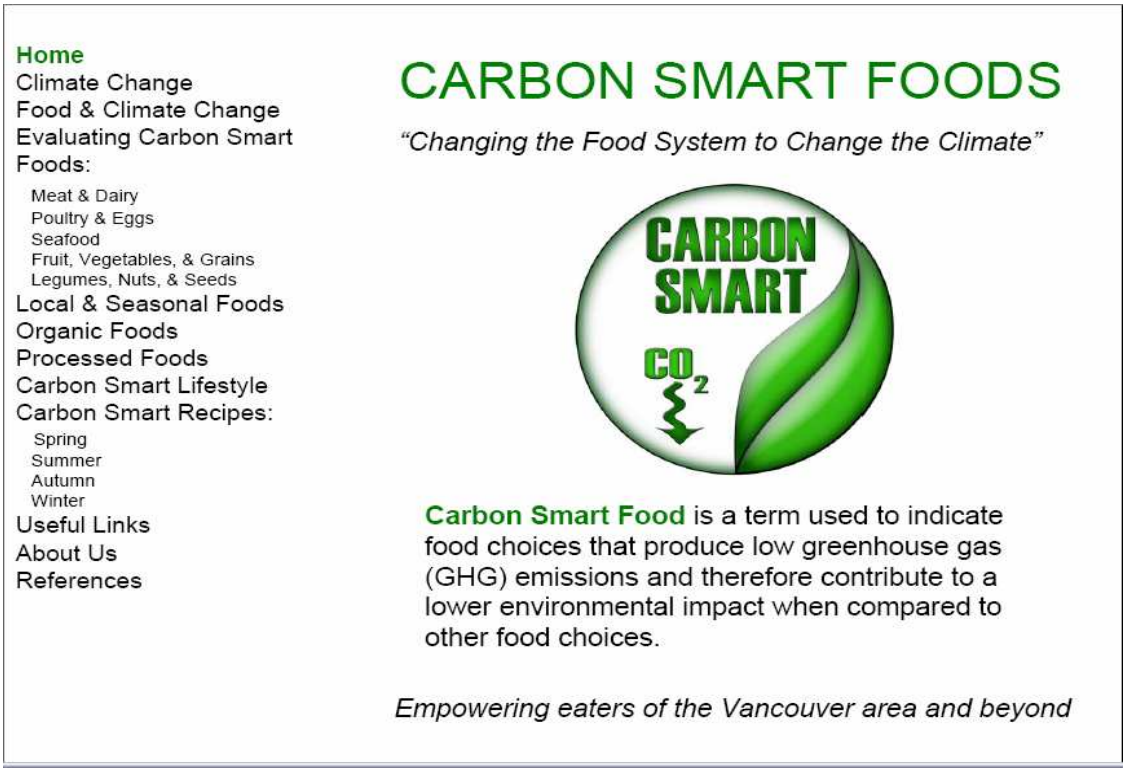






APPENDIX B –Label

APPENDIX C—Website Examples (Full viewing refer to pdf file)



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CARBON SMART FOODS

"Changing the Food System to Change the Climate"

CARBON SMART CO_2

Carbon Smart Food is a term used to indicate food choices that produce low greenhouse gas (GHG) emissions and therefore contribute to a lower environmental impact when compared to other food choices.

Empowering eaters of the Vancouver area and beyond

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Local and Seasonal Foods

Low GHG Emissions

The average North American meal "travels 2, 400 km to get from field to plate and contains ingredients from 5 countries in addition to our own"[21]. The total distance food travels from the farmer to consumer's plates is termed "food miles." Food miles contribute to 11% of food related GHG emissions because it relies on large amounts of fossil fuels from airfreight and trucking transportation[5]. If a typical North American family were to buy all their food locally for the entire year, it would decrease their GHG emissions by 4-5%[5]. Although, switching from animal-based proteins to plant-based proteins would have a more significant impact on reducing GHG emissions than eating entirely locally, it should be noted that consuming local foods have many other benefits including fostering a strong and vibrant community, stimulating the local economy, lowering food costs for consumers, and providing foods that have optimal freshness and flavour[5, 21].

How?
The best place to buy locally and seasonally produced food is at your nearest **farmer's market and local businesses** that are committed to selling and serving local food. A great directory of local businesses, farmer's markets, and foods that are in season within metro Vancouver, is available online at http://www.getlocalbc.org/en/.

Another way to eat locally and seasonally is to use your backyard and **grow your own food!** Planting garden vegetables, fruit trees, and herbs will eliminate food miles and comes with the benefit of having an array of fresh and flavourful food right outside your door!