

UBC Social Ecological Economic Development Studies (SEEDS) Student Report

**Sustainability Assessment of Flour Served at UBC's Food System**

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## **Abstract**

Community based action research was conducted to assess the sustainability of the current UBC Food Services (UBCFS) products. Data was collected mainly through online research, literature reviews, and contacting relevant UBCFSP partners, current UBCFS suppliers and potential new suppliers via emails, phone calls or personal interviews. Our focus was evaluating the sustainability of one of the main staple ingredients, flour. Sustainability of conventional and organic flour was assessed through ecological footprints, production and processing practices, packaging and waste disposal, and possible health effects; the potential of switching from conventional flour to organic and local flour was also examined. Even though, UBCFS expressed interest in purchasing more sustainable organic flour, the main obstacle preventing this change is cost. Organic flours costs up to three times more than conventionally produced flour and thus, increasing input prices would surely lead to increased food prices at UBC.

Our group recommends future AGSC 450 students to extend our research by exploring more local and organic suppliers for other staple food items of interest to UBCFS. It will also be important to raise students' awareness on the advantages of local and organic food products through education and advertisement. Survey can be conducted to statistically analyze students' willingness to accept higher prices for higher quality products. As a way to advertise UBCFS efforts to supply more sustainable food products, we feel that it will be beneficial to put a recognizable logo on food products that are made from organic and local ingredients.

## **Introduction**

The UBC Food System Project (UBCFSP) is an ongoing community based action research that aims to enhance the ecological, economic and social sustainability of the food system at UBC. As community of learners, this project provided students with the opportunity to examine the interactions on our campus community, and enabled us to apply our knowledge to improve sustainability on our campus.

In order to improve the level of food sustainability at UBC, we need to review the food ingredients (which in our case is flour) that are currently being served at UBC's Food System, to identify the existing problems, to create problem-specific goals and steps, and finally to translate our findings into actions and progress towards sustainability. Specifically, we collaboratively worked with campus food system stakeholder UBC Food Services and commercial flour suppliers throughout the project.

For the purpose of our project, we focused on the examination and evaluation of the sustainability of conventional flour used by UBC food services. In terms of local flour, we have defined it as grown in Canada. Our main research question is to find out the differences between organic and conventional flour, and search for an alternative local organic flour supplier for the UBC Food Services. Consequently, this will lead to an increase in the number of certified organic ingredients used and sold at campus food outlets. Furthermore, we made recommendations targeted towards UBC Food Services as well as future AGSC 450 students based on our research findings, in hopes of pursuing UBC's vision of sustainability in the near future.

## **Problem Definition**

In a world of increasing awareness for sustainability at campuses worldwide, we are noticing the trend of post secondary educational institutes vastly promoting and incorporating the idea of sustainability on their campuses. The food sector plays an important role in this issue, because most of the food outlets on campuses are trying to become more sustainable by growing or purchasing local, organic and ethical foods. Due to the alarming rate of increase in diet related diseases such as diabetes and obesity, the food services department became more crucial and responsible for regulating the quality of foods served to the public.

Flour is one of the main staple ingredients currently bought in high volume by UBC Food Services. For our particular scenario, we will be conducting a sustainability assessment on flour. With that as the foundation of our project, our project partner requested us to look into potentially switching from purchasing conventional flour to organic flour. In addition, we made suggestions and provided options for the UBC Food services to become a healthier and more sustainable food distributor. In order to gain deeper understanding to make appropriate recommendations, another aspect of our research focus is to discover the different types of flour and their profile characteristics to provide the foundation for flour choices. Moreover, the differences in processing methods for conventional flour and organic flour will also be discussed. The end result of our project would enable UBC Food Services to become a true model of a sustainable and local-oriented food service provider.

## **The Broader Problem**

In relation to our problem definition, the issue that we are addressing pertain to a

broader problem of reflecting a bigger picture. Because the UBC Food System can be perceived as a microcosm of the Greater Vancouver food system, problems identified and changes made in UBC can be accountable as a smaller version of Vancouver. If alterations made in UBC are successful, similar changes can then be made to improve food sustainability in Vancouver as a whole. Moreover, by potentially switching to local suppliers for flour, we are reducing the demand flour suppliers situated further away. In addition, food miles and carbon footprint marked by the distance raw materials travel to arrive at UBC can be served as a baseline indicator. It can be referred to by Vancouver and other cities, looking for alternatives to reduce environmental damages, which will plant the seed for improving the global food system. The sustainability movement towards local and/or organic products on campus may increase students' awareness and impact their everyday purchasing decisions for more sustainable food products. In turn, this will affect their lives outside of campus and help further expand the local and organic markets in Vancouver. This expansion will likely spread globally and will have influence on the types of flour produced based on consumer demand. Production of conventional flour may adjust to production of organic flour in the long run, thus reducing the energy intake required for production.

### **Group Reflection on Vision Statement**

The vision statement is definitely a great set of collaborative ideas that work towards reaching a sustainable food system. They are set out for us to realize the reality of our surroundings, to be aware of the results of our actions, and to motivate us on preserving the natural world. This world was made to provide us and all other species the means for survival

and flourishing at its best, and this is how we ought to keep it.

Each of the seven points of the vision statement is important in its own way and plays a vital role in our research project for the UBC Food Services. This is where our value assumptions regarding the vision statement allow us to decide on the areas that are not only crucial to us, but also connect with the goals of our project. The concepts that we, as a group, value and have focused on are the ability to obtain local, affordable, and quality foods that we consume at UBC and the effects of these foods have on our health. All these points have been considered within our project with a brief description and argument for each.

First of all, we agree with the first principle regarding on locally grown, produced and processed food. Normally food should not have to travel long distances to reach our plate. Naturally, people who have lived in western Canada for generations should have been able to survive on the food that was grown here, so why not now? In addition, food should also be produced and processed locally as this reduces labor and carbon emissions that would otherwise be high if food was produced elsewhere. As a result, our group has contacted local flour mills as options for the UBC Food Services.

The second principle regarding waste recycling and compost is also agreeable on. However, it is not valid in our case as UBC Food Services use up all their flour and therefore, do not have waste.

The next principle, talking about ethnically diverse, affordable, safe and nutritious foods played a role in our research as well. This principle is definitely important in sense that in Vancouver there is a large number of different ethnic groups with different levels of income. Therefore, all local food should be affordable, able to apply to different ethnicities, safe to



consume and high quality. The local producer provides affordable flour that is locally produced or processed, free of preservatives or additives and is mostly whole grains.

Although we agree with the fourth principle on how important it is to educate customers on food processing, nutrition, ingredients and cultivation, this was beyond the scope of our study and therefore no research in this area was conducted. Even though there was no research on it, the local producer of flour did provide some information regarding on the processing and nutrition of flour to his customers.

The last three principals have also been discussed, and we also agreed with the ideas that food is imperative in bringing people together. For example, the relationship between students and local food would strengthen if students from UBC are offered the choice of purchasing all foods that were grown or processed locally. This will bring awareness to the local foods that were produced under environmentally friendly methods by using natural fertilizers and avoiding chemicals. At the same time, farmers will receive fair prices in return for their efforts for participating in sustainable farming, creating a win-win situation.

Overall, our group's main position was not only working towards improving sustainability by finding local producers of flour for the UBC Food Services and trying to decrease the carbon footprint, but also trying to find healthier options of flour for the UBC population's consumption. We believe that the UBCFSP should place a larger emphasis on working towards providing more nutritious, healthier and natural foods to consumers. This translates into less preservatives, additives, chemicals, and more locally and organically grown foods.

As a group, we agreed on all the UBCFSP principles and would not add or subtract any

points because, as described before, they are all valid and the concepts they focus on is definitely aimed in the direction of increasing sustainability.

## **Methodology**

The UBC Food System Project is based on the concept of community-based action research (CBAR). Throughout the process we worked in collaboration with UBCFSP partners and stakeholders to develop and implement our research direction. Our team's research methodologies mainly included group discussions, online research, literature reviews, over the phone and in-person interviews, and email correspondences. The first step we took in this project was to familiarize ourselves with the tasks involved with our assigned topic. We emailed Ms. Dorothy Yip, the General Manager of retail operations, purchasing and project coordination, to obtain a list of the grocery products purchased by the UBC Food Services.

Prior to beginning our research, we held a preliminary meeting with Ms. Yip to gain a better understanding of the processes involved in purchasing ingredients and the needs of improving the UBC food system. In this meeting, Ms. Yip demonstrated a strong interest in switching from purchasing conventional flour to organic flour. Thus, for our project we focused mainly on the product flour. We also looked into the feasibility of switching to organic and/or local honey and pasta. In addition, we conferred with the two other groups working on the same project to ensure each group is covering a different staple ingredient. We also discussed of the proposed approaches for completing this project.

Sustainability of flour is assessed by analyzing the ecological footprints, production practices and processing methods, volume and prices, packaging materials, and the possible

health effects of the various type of flour. Anita's Organic Grain and Flour Mill was suggested by Ms. Yip as a potential supplier of organic and local flour. We contacted the company through emails and phone interviews to inquire about their products' prices, production practices, origin of raw materials, and ability to meet the volume demanded by the UBC Food Services. In addition, we contacted another local company called Millstream Flour Mills for the same information. After obtaining the prices from these companies, we discussed with Ms. Yip about the feasibility of switching to these suppliers.

## **Findings**

### **Central Findings and Group's Position**

Flour is mainly used as a thickening agent and/or a coating in cooking and in bake shops of UBC Food Services (pers. comm., 2009). The previous annual quantity ordered was approximately 9660 kg. Robin Hood and Gordon Food System (GFS) were the two major suppliers responsible for 1840kg and 7760kg of flour respectively (Please refer to Appendix I for more information). For both suppliers, the origin of flour is 100% domestically produced in Saskatchewan and/or by local farmers. Saskatoon Mill is the processing location, and products are transported by CN Rail via truck (pers. comm., 2009).

In this situation, the flour produced and processed is considered to be local, and it is relatively more sustainable when compared to importing flour from other countries. However, sustainability can be improved by introducing domestically produced organic flour. Organic flour is more ecologically sustainable in terms of minimizing chemical use (pesticides, herbicides and fertilizers) contamination and pollution, maintaining biodiversity, improving nutrient

recycling and soil quality, implementing less energy intensive practices, and reducing green house gas emission (NCAT, 2004; Ziesemer, 1992).

UBC Food Services is willing to switch to more sustainable and greener food choices. However, for the same amount of flour purchased, Anita's organic flours are more expensive than conventional flour, such as Robin Hood and GFS. Specifically, bag of 20lb Anita's organic all-purpose unbleached flour is priced at \$44.10, which is three times higher than Robin Hood all-purpose bleached baker flour. Purchasing budget is the major barrier in switching to a more sustainable organic flour supplier for the UBC food system. Besides, an increase in flour input prices will result in increased food prices at UBC. Therefore, it is almost impossible for UBC food services to forgo conventional flour and adopt organic flour at this moment because the price difference between the two types of flour is very big. Overtime, improving milling technology may help drop the price for organic flour due to a possible decrease in its production cost.

### **What is Flour?**

Wheat is one of the main agricultural commodities grown on the Canadian prairies, which consist of Saskatchewan, Alberta and Manitoba (Agricultural and Agri-food Canada, 2009). 7 wheat types, including over 200 varieties, are grown in Canada, and these include: Canadian western red spring, Canadian prairie spring red, Canadian prairie spring white, Canadian western extra strong, Canadian western amber durum, Canadian western soft white spring and Canada western red winter (Agricultural and Agri-food Canada, 2009).

Flour is a finely ground powdery food prepared from a variety of edible seeds, nuts and vegetables (How products are made, 2009). The common types of flour available in the market are wheat, maize, rice, barley, oats, buckwheat, soy, arrowroot, and potato (Lovell, 1994).

Among all the different varieties of flour, wheat flour remains as the most popular ingredient used in baked goods around the world (Lovell, 1994).

### **Types of Wheat Flour:**

The characteristics of wheat, such as protein and gluten contents, determine the composition and functional properties of their end products (Wheat flour, 2003). Wheat is classified by the hardness of its kernel (Wheat flour, 2003). In general, the higher the protein and gluten content in the flour, the harder the wheat (British Nutrition Foundation, 2004). Hard flour is suitable for bread making due to its high quality of gluten content; whereas soft flour contains weaker gluten content and are desirable for many tender foods such as pastries and cookies (How products are made, 2009).

1. **All purpose flour** is made from the finely grounded endosperm of the wheat kernel and only the bran and germ are eliminated during the milling process (Wheat flour, 2003). All purpose flour is made by mixing a combination of soft and hard wheat which makes it suitable for a range of acceptable baked goods such as bread, cookies and cakes (Wheat flour, 2003).

2. **Whole wheat flour** is brown in color because it is derived from the entire wheat kernel that contains the bran, germ and endosperm (Lovell, 1994).

3. **Pastry flour** is also known as the cookie flour. It is made from soft wheat, which is relatively low in gluten content when compared to all purpose flour (Lovell, 1994). Therefore, the flour is not very glutinous and is used to make fine textured cookies and pastries (Lovell, 1994).

### **Organic Production Principles and Benefits**

As conventional flour production accelerates over the years, wheat producers began to see the detrimental effects and potential danger of this industrialized production method.

Organic production focuses on maintaining and enhancing principles such as biodiversity, sustainability, natural plant fertilization, soil quality, and water conservation (Kuepper & Gegner, 2004). Organic wheat is grown by producers whose practices fulfill the central principles that are stated above. Several specific methods include replacing toxic chemical applications, like pesticides and herbicides with natural pest and weed management, using natural fertilizers instead of synthetic chemicals, implementing crop rotation to improve nutrient recycling and avoid potential increase of pest population (Kuepper & Gegner, 2004; NCAT, 2004). These practices are more sustainable, which can improve land productivity and quality of environment overall.

### **Conventional Flour Processing**

Conventional flour processing requires the addition of several chemicals and the processing method varies from organic flour. The incentives to produce conventional flour are the reduced time in waiting for the flour to mature, and lower production costs (Wheat flour, 2003). Numerous flour producers, such as Robin Hood and GFS, use chemical treatments during production to increase productivity and thus results in higher financial profits. The following section illustrates the significant processing methods employed by conventional flour producers.

#### **1. Enrichment**

The milling process involves the removal of the bran and germ from the endosperm. Vitamins, minerals, dietary fiber, protein and fat, once appeared in the bran and germ, are removed during the process (Canadian National Millers Association). Thus, conventional white flour in North America today are enriched with food additives, such as B-vitamins and iron in

amounts to equal those amounts in whole grain (Canadian National Millers Association).

## **2. Chemical Bleaching and Maturing Agents**

Conventional all-purpose flour undergoes additional treatments, such as bleaching and maturing, after milling and such treatments will affect flour performances when in the process of baking (Wheat flour, 2003). Bleaching agents are added to whiten and brighten flour color. Also, maturing agents are added to flour to help with gluten development (Wheat flour, 2003). Conventional all-purpose flour usually contains a small amount of bleaching agents, such as benzoyl peroxide or chlorine gas (Harrel, 2002). Chlorine works as a maturing agent as well to oxidize the flour and to strengthen the gluten in it. Hence, this treatment accelerates the flour aging process and improves baking quality (Harrel, 2002). Flour develops gluten once it is oxidized and that renders the flour's capacity to rise during in the process of baking (Wheat flour, 2003). On the other hand, gluten in freshly milled organic flour with no chemical additives is not fully oxidized and is still immature and inelastic (Harrel, 2002). Consequently, the flour lacks raising properties and is not suitable for baking.

Conventional agriculture relies on intensive application of synthetic fertilizers, chemicals, and concentrated feeds. This is extremely unsustainable since those commercial products require large amount of nature resource and energy inputs to be produced in the first place (Ziesemer, 2007). Organic production utilizes fewer inputs and less energy-demanding practices. Although it often demands more labor, it generates more employment opportunities and is supported by higher price premiums for the products (Ziesemer, 2007). Since organic production uses less energy inputs, it also contributes to minimizing green house gas emission.

### **Organic Flour Processing**

Naturally aged organic flour with no added chemical profiles are often labeled as “unbleached flour” (Anita’s Organic Grain and Flour Mill, 2009). The major processing difference between conventional flour and organic flour is the natural aging of organic flour. Natural aging is not as cost effective and time saving as the use of chemical bleaching and maturing agents used during conventional flour production (Harrel, 2002). Natural aging of flour generally requires several weeks or months (Leonard, 1999b). This process occurs when the flour is exposed in the air and oxygen oxidizes the surfaces of the flour (Lovell, 1994). As oxygen oxidizes gluten-forming proteins, it allows the flour to be more glutinous and suitable for making breads (Wheat flour, 2003). The flour is then kept in silos in the mills, and is susceptible to pest infestation or microbial contamination (Wheat Flour, 2003). Not only are organic flour producers refrained from selling the flour delayed by natural aging, but also risking an overall diminished yield (Wheat flour, 2003). Another distinctive aspect of organic flour is the yellowish color contributed by the carotenoid pigments, contrasting with the color in conventional bleached flour (Wheat flour, 2003).

### **Shelf Life**

Robin Hood and GFS all-purpose flour have the same twelve month shelf life from the date of production. On the other hand, the shelf life of conventional whole wheat flour is about nine months from the date of production (pers. comm., 2009). Flour should be stored in a clean and dry area under room temperature. Organic flour with no chemical additives cannot be stored as long as conventional flour and the shelf life is estimated to be around six months in length (Yip, 2009).



### **Packaging and Waste Disposal**

Proper flour packaging materials can keep the product free from foreign contaminants and dampness, as well as maintaining freshness during prolonged storage (Robertson, 2006). For both Robin Hood and GFS, polyester and polyethylene laminated paper bags are commonly used for packing flour in various volumes (Robertson, 2006). UBC food services purchase a significant amount of flour annually, and the amount of packaging wastes are substantial correspondingly. Nonetheless, UBC waste management system does recycle most of the plastic or paper food packages and thereby, contributing to creating a more environmentally friendly campus.

### **Where Grains Go?**

As an extension to our project, Ms. Yip requested us to find out where majority of the grains go after harvested in Canada. Dr. Vercammen, a professor with in depth knowledge of the Canadian wheat market and international trade of this commodity, states that 80% of Canada's wheat production is exported. The main importers are Europe and parts of Asia. The remaining 20% of grains is for domestic consumption. Prior to exporting, the grains are shipped to either Eastern Canada (40% of the 80% being exported) or to Western Canada (60% of the 80% being exported) for processing (Dr. Vercammen, 2009). Contrary to popular belief, there is minimal trade with the US because US is a major wheat exporter themselves (Dr. Vercammen, 2009). The markup from grains to flour is not that high, since flour is still considered as a bulk commodity. The largest markup is from turning flour into finished products, most significantly pastries and baked goods sold by UBC Food Service.

Our group thought of setting up a small processing plant located at UBC so we can purchase

organic grains and process it with limited chemicals to ensure the quality of the flour. However, we deemed it to not be feasible as grain processors enjoy economies of scale. Grain processing is a highly centralized and consolidated industry (Dr. Vercaemmen, 2009). For the amount of flour we purchase it would be more reasonable for us to simply buy flour that has already been processed.

We also evaluated on the possibility to expand grain production in BC to increase supply. Unfortunately this option was also ruled out because of climate issues and there is very few arable land for grains in BC. Even if there is suitable land, we have to consider the opportunity cost for producers to switch out of their original crop. The requirements to grow grains are similar to that of grapes (Dr. Vercaemmen, 2009). Currently, BC's wine industry is flourishing; therefore no producers would likely be switching from producing a high return product into a low return commodity.

### **Ecological Footprints**

Ecological footprint is a tool used to quantify and assess the area of land required to support resource consumption of a defined population (Collins & Fairchild, 2007). Being sustainable incorporates the concept of minimizing ecological footprint to reduce green house gas emission, natural resource and fuel consumption. The concept also includes both during the growing of food and the energy spent over the course of processing food. Since our group has no authority to modify production practices of flour, it leaves us with the option of assessing the suppliers' current production conditions and from that, choose alternate food products produced under less energy intensive methods. For our project, we chose to focus on finding local food sources and/or organic products to reduce the ecological footprint of flour.

The foods we enjoy on campus are comprised of countless ingredients, and have often traveled a long way from its origin. Players in the supply chain encompasses producers, to various processors, packaging companies, distributors and handlers to have the product finally be placed on shelves at UBC food retail outlets. Foods are transported regionally and globally for different reasons; such as geographical and climatic reasons where products can only be produced in specific areas. Coupling with consumer demand, low labor costs for harvesting or processing, and higher selling price elsewhere all drive the tendency for products to travel to a different destination. Our goal of minimizing the ecological footprint can be achieved through the perspective of reducing the distance traveled of the product.

Even though a majority of foods grown organically require similar land and natural resources when compared to conventional practices, the conventional production method is considered as more energy intensive (Collins & Fairchild, 2007). In this context, by switching to purchasing organic flour serve the purpose of minimizing ecological footprints in addition to other health benefits that will be discussed in the next section.

### **Health and Nutrition of Flour:**

#### **All Purpose Flour**

As mentioned before, all purpose flour consists of only the endosperm, since all germ and bran from the grain have been removed during the milling process (flour, Food Dictionary, Epicurious, 1995.) As a benefit, the flour is white but as a disadvantage, all the vitamins and minerals present in the bran and germ have been lost due to the processing. Germ and bran are known to contain vitamins such as niacin, riboflavin, thiamin and iron, but all purpose flour is deficient in these. Therefore, people consuming only all purpose or white flour products could

develop deficiency symptoms if they don't consume other vitamin B and iron sources.

This type of flour is also low in fiber due to the absence of germ and bran. As a result digestive problems such as constipation or hemorrhoids can arise if daily consumption of fiber content isn't high enough.

In addition, white and all purpose flour is unhealthy for the humans due to the high blood glucose responses it produced after consumption. In a study comparing the blood glucose responses in both insulin-dependent diabetics and non-insulin dependent diabetics, researchers compared wholemeal rye bread, mixed wholemeal rye bread, and white bread. The results were astonishing in the sense that the bread produced from pure wholemeal rye flour induced the slowest blood glucose response (ie. the lowest spike in blood glucose level, after consumption of the bread and the insulin-dependent diabetic required the least insulin to balance the sugar levels), while the bread made purely from white flour had the highest spike and required more insulin (La Baguette, 2009). Yet one thing to keep in mind is that the high sugar level spikes not only happen to diabetics, but also to non-diabetics. The only difference is that their bodies are more capable of handling high sugar levels because of their bodies' higher sensitivity to insulin. These can be possible problems for students that are busy, live by themselves and don't have time to focus on their diet. Therefore their diet consists mostly of quickly prepared meals.

### **Whole Wheat Flour**

In contrast to all purpose flour, whole wheat flour is better off nutritionally. Whole wheat flour not only contains the endosperm, but as well the germ and bran, which as mentioned before contain vitamin Bs, iron, fiber and other nutrients. Therefore the nutritional

content is higher than that of all purpose flour, and a much healthier option. The chance of having digestive problems or ending up with iron, or vitamin B deficiency disease is low. Just to compare the effects that whole wheat flour has, compared to white or even all purpose flour, is shown in a study done on rats. In this study rats were fed diets with either whole wheat flour or white flour. The results showed the fact that 30% of those rats that consumed white flour died versus 4% dead of those that ate whole wheat flour. This study just shows how important whole unrefined grains are (La Baguette, 2009)

### **Pastry Flour**

As mentioned before, pastry flour is low in gluten, but this type of flour is still like a white, all purpose flour except for the lower protein (gluten) levels. Therefore, this type of flour isn't any healthier than all purpose flour, only maybe more digestible to Celiacs who are allergic to gluten.

### **Enriched Flour**

Enriched flour is essentially all purpose flour that can be both enriched and non-enriched. As described before, enrichment is the supposed return of the vitamins and minerals that have been lost due to the removal of germ and bran during the making of white, all purpose flour. Although one may think that the enriched flour is healthier than un-enriched flour, this is not necessarily so. First of all, when vitamins and minerals are being added back, only portion of what has been lost is returned (Gardner, 2004) And second of all, the availability of vitamins in enriched flour may be lower because the vitamins, being synthetic, act differently in a body than natural vitamins, and also they are less light and heat stable (La Baguette, 2009)

Therefore in the end, enriched flour isn't really more beneficial than regular un-enriched flour.

### **Bleached Flour**

In addition to the previous description of bleached flour and the different additives that whiten the flour, alloxan, a toxin that is used in laboratory animals to induce diabetes, is present in white bleached and probably all purpose flour (Zeus Information Service, 2005) Alloxan is thought to be linked to diabetes in humans and according to Dr. Hari Sharma's Freedom from Disease, this chemical "initiates free radical damage to DNA in the beta cells of the pancreas, causing the cells to malfunction and die' (Zeus Information Service, 2005). Therefore, if these cells stop working normally, their production of insulin stops, ie. in the long run causing "adult-onset type 2 diabetes" (Zeus Information Service, 2005). So before one puts a piece of white bread or pastry in their mouth; they should really think about what they are eating and if they are ready to face the consequences.

### **Organic Flour**

Processing of this flour being described before, this is a healthier option, because the use of chemicals in the process is avoided or has been reduced, therefore, in the long run, it is a much healthier option than non organic flours that may contain bleaching or preserving agents.

### **No Additives/Preservatives Free Flour**

The title gives it away, but this type of flour would also be one of the healthier options, due to the absence of chemical/synthetic additives and preservatives that are not necessarily healthy for human consumption. And so, we would suggest this type of flour over bleached, enriched or all purpose flour.

## **Recommendations**

It was very meaningful for our group to be involved with the improvement of sustainability in UBC Food System. Despite our efforts, there still remain areas that our group would love to expand on but we simply did not have sufficient time to do so. Thereby, our group has several recommendations for future AGSC 450 students and UBC Food System representatives to continue exploring on.

### **For UBC Food Services**

Through this project, our group realized the importance of educating students of the quality of their food. Consequently, there might possibly be an increase in willingness to purchase for products that are produced locally and organically at a premium price. Although UBC Food Services stated that passing on the increase in cost for raw materials to students is not the best solution, but our group believes if there is demand for local and organic products, and students are willing to pay a premium, then UBC should supply it. To find out if students are generally supportive of small price increases in exchange for higher quality of products, random surveys can be conducted around food outlets.

Another method of raising students' awareness to UBC Food Services' continuous effort to supply high quality products is to put a recognizable logo on every package of products that are made from organic and local ingredients. Specifically for our project on flour, baked goods such as cinnamon bun or cookies can be labeled with the new logo on their respective packaging. UBC Food Services can consider collaborating with AMS Lighter Footprint Strategy to share their existing logo to demonstrate the food product is produced with minimizing environmental impacts in mind. As a long term goal, our group also recommends more

promotions and expanding varieties of local and organic food products in the food retail outlets.

### **For Future AGSC 450 Students**

Relating back to utilizing a logo to signify a local or organic product, future AGSC 450 students can either design or host a logo design competition to get students from different faculties to contribute their ideas. Future AGSC 450 students can act as facilitators between UBC Food Services and AMS to create partnership for the AMS Lighter Footprint Strategy.

In addition to flour, our group also made an effort to find local sources of honey. However, due to time constraints, we were not able to do a more thorough analysis of honey. According to our findings, there are local suppliers of honey that can meet the demand of UBC Food Services. Thus, we suggest that future AGSC 450 students to research on the types of honey, the available honey suppliers in Vancouver, and the potential advantages associated with switching to local and/or organic honey. Students can also explore other food items that UBC Food Services order. Some other possible food items include dairy products, drinks, eggs, fresh berries, fresh produce, meats, nuts, seafood and candies.

The time limit of the course hindered our group's desire to examine additional possible supplier choices for other staple foods ordered by UBC Food Services. Future AGSC 450 students can further extend our project by looking into new local and sustainable suppliers for pancake mixes, flaxseeds, and sesame seeds. This was recommended to us by Anita's Organic Grain and Flour Mill as alternate options they can offer to UBC Food Services as flour did not work out. Aside from the products listed above, our group suggests future AGSC 450 students to look at different local suppliers for other staple food items of their interest that UBC Food



Services can order from. However, our group wishes to once again emphasize the importance of ordering from ethical suppliers who purchase their raw materials from a relatively local source and process without preservatives to ensure the freshness of UBC's food products.

## **Conclusion**

By participating in the UBC Food System Project, our team researched on the possibility of enhancing the ecological, economic and social sustainability of the food system at UBC. We conducted sustainability assessments on the conventional flour currently used by UBC Food Services and organic flour. It also involved looking at the feasibility of switching to an organic flour supplier. Based on our research findings, we conclude the following for the sustainability assessments: organic flour is more ecologically friendly than conventional flour; conventional flour is more economical; and organic flour is more socially sustainable.

Organic flour is more ecologically friendly because organic production employs sustainable production methods and it has tremendous benefits to the soil condition and environment. In contrast, conventional flour production requires much higher energy inputs, thus having negative impacts to the environment. Furthermore, our group contacted several local flour suppliers in attempts to determine the price differences in purchasing conventional and organic flour. We obtained replies from two companies, and we realized that conventional flour is more economical simply because the purchase cost is significantly lower than organic flour. Our paper also investigated the health benefits of conventional flour versus organic flour. We found that organic flour contains superior nutrition that results from organic production practices and reduced levels of chemicals used during processing.

All in all, the major barrier to switching from purchasing conventional flour to organic flour is the elevated cost. Despite of that, flour is not the only ingredient in any food product; meaning a tripling of flour cost does not correspond to a tripling in the overall product cost. Perhaps when the increase in price level of organic flour can be offset by other ingredients' drop in costs, our group's idea can proceed. Nevertheless, UBC Food Services does purchase a vast amount of flour annually. For them to decide to switch to purchasing organic flour is a considerable step towards achieving sustainability at the UBC food system.

## **Appendix I**

### *Grocery List 2008 - Annual Quantities*

<b>Type</b>	<b>Size</b>	<b>Quantity</b>	<b>Supplier</b>
All Purpose Bakers Bleached Flour	2 x 10 kg	71	Robin Hood
All Purpose Bakers Bleached Flour	20 kg	17	Robin Hood
All Purpose Bleached	20 kg	388	GFS (Gordon Food System)
Flour Pastry	20 kg	2	Robin Hood
Flour Pastry Monarch	20 kg	3	Ogilvie
Whole Wheat Flour	20 kg	2	Robin Hood

Total all purpose flour:  $(2 \times 10) \times 71 + (20 \times 17) + (20 \times 388) = 9520$  kg

Total flour pastry:  $(20 \times 2) + (20 \times 3) = 100$  kg

Total whole wheat flour:  $(20 \times 2) = 40$  kg

## **Appendix II**

### *Alternate Suppliers' Price List*

#### **Anita's Organic Grain and Flour Mill**

43615 Yale Road

Chiliwack, B.C. V2R 4J6

<b>Type</b>	<b>Size</b>	<b>Prices</b>
Organic All Purpose Unbleached Flour	10kg	\$26.40
Organic All Purpose Unbleached Flour	20kg	\$44.10
Organic All Purpose Cake & Pastry Flour	10kg	\$31.25
Organic Whole Grain Soft Wheat Pastry Flour	20kg	\$55.00
Organic Whole Grain Stoneground Wheat Flour	20kg	\$42.00
Organic Whole Grain Fine Grind Wheat Flour	20kg	\$42.00

#### **Millstream Flour Mills**

7983 Webster Road

Delta, B.C. V4G 1E4

<b>Type</b>	<b>Size</b>	<b>Prices</b>
Unbleached White Flour	20 kg	\$35.00
White Corn Flour	20 kg	\$30.00
Yellow Corn Stoneground Flour	40 lb	\$37.00
Whole Wheat Stoneground Flour	20 kg	\$36.00

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