

Modeling UBC Food System Sustainability - Group 7

University of British Columbia

AGSC 450

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Abstract

The UBC food system (UBCFS) is defined as having five main components – consumers, retail outlets, corporate sponsors, waste, and the UBC Farm. The system is outlined by three different boundaries, specifically the geographic area of UBC, the surrounding area of the Greater Vancouver Regional District, and all national and international aspects of the UBCFS. This system, as it currently operates, cannot be sustained into the future. Thus, it is necessary to evaluate the sustainability of the UBCFS so it can be improved and operate in a way that does not compromise the health and well-being of future generations.

In this study, goals for the UBCFS are given. A sustainable food system is defined and a continuum with conceptual definitions of varying degrees of sustainability is presented. Specific indicators of ecological, social, socio-economic, and economic sustainability, which are necessary to evaluate the sustainability of the UBCFS along the continuum, are given and explained. Based on this above information, a research design for studying the sustainability of the UBCFS has been developed. This proposal uses both quantitative and qualitative research methods and is intended to enable future researchers to gauge where the UBCFS falls on the sustainability continuum. It has three stages and is designed to take place over four years. Finally, recommendations for future study of the UBCFS are given.

The University of British Columbia (UBC) is a large community where people come to learn from leaders in their field of interest. What most people don't realize is how important the food system at UBC is to the continued tradition of seeking a higher education. The food system incorporates all aspects related to food on campus and has a significant role in feeding the UBC community. However, the UBC food system (UBCFS), as it presently operates, is not a system that can be sustained far into the future. Therefore, it is important to evaluate the sustainability of the UBCFS so the system can be improved and we can enable the present population to live in a way that does not compromise the health and well-being of future generations. In this study, we describe the current components, boundaries, and connections that define the UBCFS and outline goals for this system. We propose a continuum along which to evaluate the current sustainability of the UBCFS and describe specific indicators of sustainability that will assist in the evaluation. Based on these indicators, we present a research proposal that describes how the future Land, Food and Community III (LFC) classes should assess the sustainability of the UBCFS. We conclude with recommendations for future study of the UBCFS.

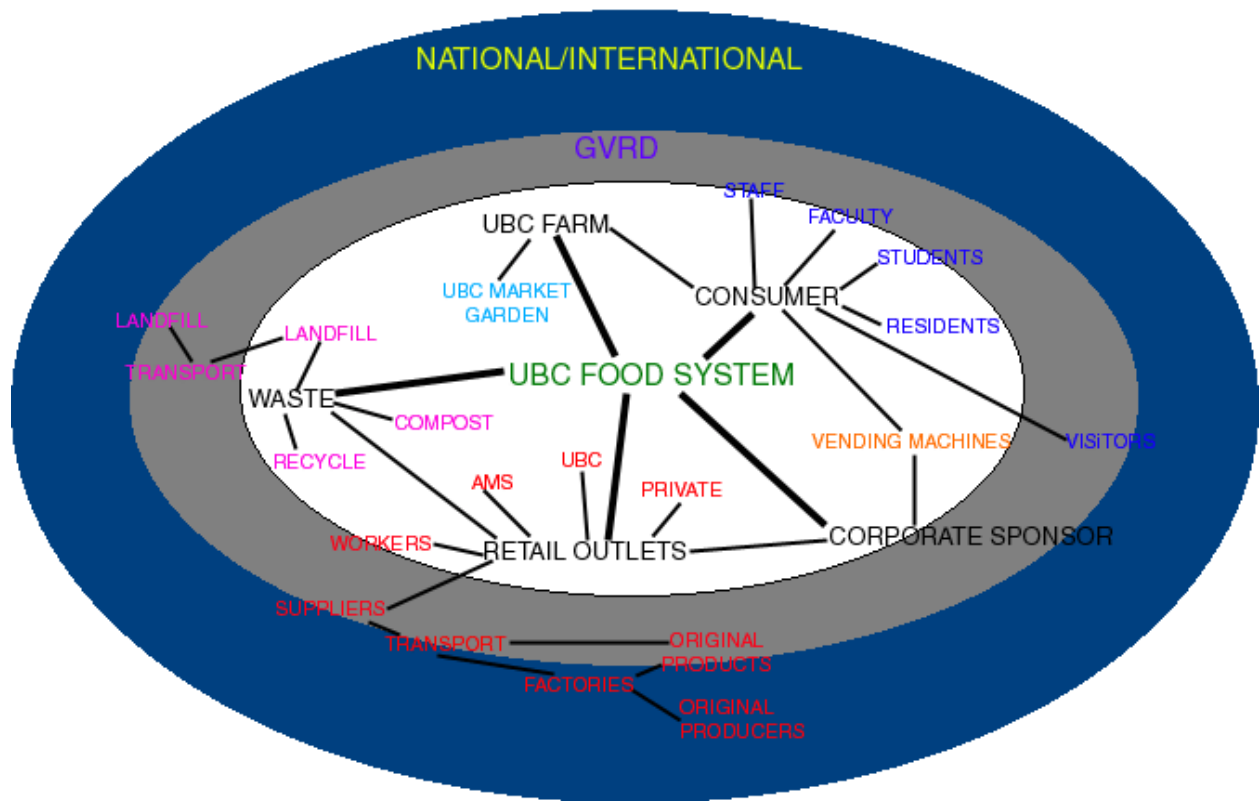
Value Assumptions

We have approached the study of the sustainability of the UBCFS from a community-based view with weak anthropocentric principles. We believe the people within the physical boundaries of UBC act interdependently as a community, and in doing so largely influence the move towards sustainability. The community can perpetuate unsustainable practices, or make changes to progress towards sustainability. Weak anthropocentrism is “a value system that acknowledges the interconnectedness of humans and other species in the natural world and also

promotes evaluating human preferences by considering the effects of an action beyond simply satisfying a human desire” (1 pg.3). We are not alone in this world; we are part of a larger ecosystem, which needs to be considered when making changes and choices for the UBCFS. Placing the values of humans above all else is a natural perspective to have because our survival depends on protecting our own interests. However, ensuring the interests and well-being of all aspects of the ecosystem is also something we consider to be necessary for our survival as well as for the continued existence of the natural world in its own right.

The UBC Food System

The current UBCFS is represented in Figure 1. It has five main components – consumers, retail outlets, corporate sponsors, waste, and the UBC Farm – and each of these is linked to additional parts of the system with which it is specifically connected.



The *consumers* within the food system are a diverse group of people and include students, faculty, staff, visitors and residents. The students, faculty and staff live on campus or elsewhere. Visitors arrive at UBC for many reasons, from numerous places, and for varying lengths of time. The residents of UBC may or may not have an association with the University, but are an integral part of the UBCFS. The number of meals and/or snacks required by each consumer varies.

Retail outlets on campus can be further subdivided into three categories: UBC Food Services, AMS Food Services, and private outlets. Connections to the Greater Vancouver Regional District (GVRD) and the national/international aspects of the food system are extremely prominent for this component due to the location of suppliers and sources of goods for these suppliers.

Corporate sponsors, such as Coca-Cola, are prominent on the UBC campus and influence the products sold at all the food outlets. Corporations are located both nationally and internationally and contribute to the food system's connection to its outer boundary.

The campus deals with *waste* by recycling, composting, or transporting it to a landfill. Recycling bins for paper and plastic are provided by UBC Waste Management (2). Several small scale compost operations and two large scale operations exist across campus (3). However, the largest component of waste is the garbage that is produced by consumers and retail outlets and transported to off-campus landfills (4).

The market garden at the *UBC Farm* grows a wide variety of crops using organic methods. The products are sold when available to consumers from UBC and the GVRD (5).

The UBCFS has three boundaries. The first one is defined by the physical boundary that demarcates the geographic area of UBC. This extends to the University Gates and incorporates

all food production, retail outlets, and disposal within those parameters. The second boundary is the surrounding area of the GVRD. The third boundary encompasses all national and international aspects of the UBCFS.

The main objective of a food system is to nourish, with safe, healthy and affordable food, the people found within. To meet this overall objective, eight goals have been developed as targets for the UBCFS:

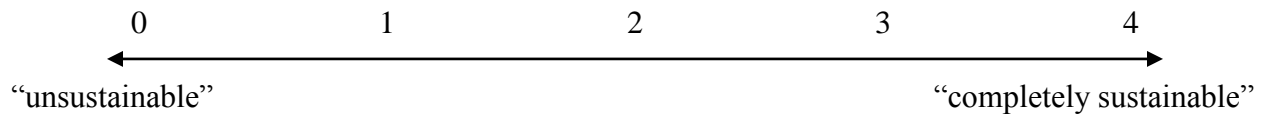
1. Increase the percentage of waste that is recycled.
2. Increase local food production and consumption.
3. Maximize the use of arable land for food production.
4. Increase the nutritious quality of food.
5. Increase the affordability and accessibility of food.
6. Increase the transparency of the food system.
7. Increase student employment by the food system.
8. Increase spending of all consumers within the food system.

These goals are an integral part of both the definition of a sustainable food system and the tools designed to assess the sustainability of the UBCFS.

The Sustainability Continuum

We define a sustainable food system as one that depends primarily on the area of land within its geographical area for food production; creates waste that can be assimilated within this area; provides equal access to nutritious and acceptable food for every person in the community; and is financially viable for every person in the community.

The sustainability of the UBCFS can be evaluated on a scale ranging from “unsustainable”, which is designated a value of 0, to “completely sustainable”, which is designated a value of 4. The scale is a continuum with clearly defined endpoints as well as several defined intermediate values.



For the UBCFS to meet the intended goals, it must progress along this continuum in the direction of becoming “completely sustainable”. It is necessary to understand that our conceptual definition of “completely sustainable”, as well as our goals for the UBCFS, represent our vision of sustainability for the future. While we recognize this is not a plausible position for the UBCFS at the present time, it is our hope that these criteria will be achieved *someday* in the future.

The Food System may be placed at any value within the range of this continuum (not restricted to whole numbers) as determined appropriate based on the following conceptual definitions:

“Completely Sustainable” 4	3	2	1	0 “Unsustainable”
<ul style="list-style-type: none"> • 100% of waste is recycled or composted 	<ul style="list-style-type: none"> • 75% of waste is recycled or composted 	<ul style="list-style-type: none"> • 50% of waste is recycled or composted 	<ul style="list-style-type: none"> • 25% of waste is recycled or composted 	<ul style="list-style-type: none"> • 0% of waste is recycled or composted
<ul style="list-style-type: none"> • 100% of food is locally grown 	<ul style="list-style-type: none"> • 75% of food is locally grown 	<ul style="list-style-type: none"> • 50% of food is locally grown 	<ul style="list-style-type: none"> • 25% of food is locally grown 	<ul style="list-style-type: none"> • 0% of food is locally grown
<ul style="list-style-type: none"> • all land viable for food production is used in this capacity 	<ul style="list-style-type: none"> • most land viable for food production is used in this capacity 	<ul style="list-style-type: none"> • half of the land viable for food production is used in this capacity 	<ul style="list-style-type: none"> • some land viable for food production is used in this capacity 	<ul style="list-style-type: none"> • none of the land viable for food production is used in this capacity

<ul style="list-style-type: none"> • <i>all</i> food is nutritious, minimally processed, and enjoyable 	<ul style="list-style-type: none"> • <i>most</i> food is nutritious, minimally processed, and enjoyable 	<ul style="list-style-type: none"> • <i>half</i> of food is nutritious, minimally processed, and enjoyable 	<ul style="list-style-type: none"> • <i>some</i> food is nutritious, minimally processed, and enjoyable 	<ul style="list-style-type: none"> • food is <i>not</i> nutritious, minimally processed, and enjoyable
<ul style="list-style-type: none"> • <i>all</i> food is affordable and accessible for all people 	<ul style="list-style-type: none"> • <i>most</i> food is affordable and accessible for all people 	<ul style="list-style-type: none"> • <i>half</i> of food is affordable and accessible for all people 	<ul style="list-style-type: none"> • <i>some</i> food is affordable and accessible for all people 	<ul style="list-style-type: none"> • food is <i>not</i> affordable and accessible for all people
<ul style="list-style-type: none"> • there is <i>complete</i> transparency of the food system 	<ul style="list-style-type: none"> • there is <i>much</i> transparency of the food system 	<ul style="list-style-type: none"> • there is <i>satisfactory</i> transparency of the food system 	<ul style="list-style-type: none"> • there is <i>some</i> transparency of the food system 	<ul style="list-style-type: none"> • there is <i>no</i> transparency of the food system
<ul style="list-style-type: none"> • <i>all</i> students who desire to be employed and meet the requirements of UBCFS are employed 	<ul style="list-style-type: none"> • <i>most</i> students who desire to be employed and meet the requirements of UBCFS are employed 	<ul style="list-style-type: none"> • <i>half</i> of the students who desire to be employed and meet the requirements of UBCFS are employed 	<ul style="list-style-type: none"> • <i>some</i> students who desire to be employed and meet the requirements of UBCFS are employed 	<ul style="list-style-type: none"> • <i>no</i> students who desire to be employed and meet the requirements of UBCFS may be employed
<ul style="list-style-type: none"> • <i>all</i> consumers desire to and are able to purchase food from UBCFS 	<ul style="list-style-type: none"> • <i>most</i> consumers desire to and are able to purchase food from UBCFS 	<ul style="list-style-type: none"> • <i>half</i> of all consumers desire to and are able to purchase food from UBCFS 	<ul style="list-style-type: none"> • <i>some</i> consumers desire to and are able to purchase food from UBCFS 	<ul style="list-style-type: none"> • <i>no</i> consumers desire to and are able to purchase food from UBCFS

To evaluate the position of the UBCFS along this continuum, specific indicators of sustainability are necessary.

Sustainability Indicators

There are various definitions used to explain the concept of an indicator. The University of Reading states that “indicators are quantified information which help to explain how things are changing” (6). The benefit of using such indicators is that various factors can be assigned a

value and can then be evaluated and positioned accordingly. To evaluate the sustainability of the UBCFS along the continuum, specific quantifiable measures related to each of the stated goals are needed. Based on these goals and our definition of sustainability, we have identified ecological, social, socio-economic, and economic indicators that will be useful for assessing the UBCFS.

Ecological Indicators Ecological sustainability refers to a system's impact on living and non-living natural systems, including ecosystems, land, air and water (7). Three ecological indicators have been chosen for their ability to evaluate the greatest environmental impacts of the UBCFS.

1. The amount of locally produced food that is sold and consumed at UBC.

An increase in local food production indicates resources are staying within the community, limited amounts of off-farm resources are utilized, and the system is becoming more self-sufficient.

2. The amount of viable land used for food production.

With an increase in the amount of land used for food production, the UBCFS will move towards being completely sustainable. The available land must be used to sustain the UBC community.

3. Amount of recyclable vs. non-recyclable waste produced.

This indicates food preparation and material consumption in UBC food outlets. One main aspect is to increase the use of reusable containers. Another aspect is to reduce the amount and modify the type of raw materials that are used for packaging food at the supplier level. An increase in the use of reusable containers and a decrease in excessive packaging will decrease the percentage of waste that is non-recyclable and increase the percentage that is recyclable.

Social Indicators The social sustainability of the UBCFS can be determined by measuring the system's impact on stakeholders. Social indicators are important for identifying key performance aspects surrounding labour practices, human rights, as well as broader issues affecting consumers, the community, and the stakeholders in a society (7). Two indicators have been chosen to evaluate social sustainability of the UBCFS.

1. *The amount of organic, whole, and minimally processed food available and consumed.*

This is an indicator of the nutritious quality of food in the UBCFS. Increased availability of these foods will create a food system that is healthier for members of the UBC community.

2. *The accessibility of information about food products and the entire food system.*

This indicates the transparency of the UBCFS. Consumers should have the right to know the contents and origins of their food, which will allow them to have a choice in food selection.

Socio-Economic Indicators Two indicators are both social and economic indicators.

1. *The number of grocery stores on campus.*

This is an important indicator of food price and availability. An increase in accessible grocery stores on campus will increase economic competition within the UBC Community, thus driving prices down in the long run and providing greater access to food.

2. *The number of food related operations.*

This includes farming operations, student employment, and food education programs. An increase in these operations enhances socio-economic sustainability through increased student involvement in the UBCFS.

Economic Indicators

To determine the economic sustainability of the UBCFS, it is necessary to consider both the economic circumstances within the system, and its impact on the stakeholders at all levels (local, national, and global). Economic indicators can identify financial statistics such as profitability of the UBCFS. Economic indicators should include the direct and indirect economic effects of a system on other stakeholders (7). Three economic indicators have been selected.

1. The number of students employed by the UBCFS.

An increase in student employment is an important factor in increasing money circulation within the UBCFS. Wages earned by students will be spent within the UBCFS. This will increase job opportunities because it becomes economically feasible for retail outlets and food producers to provide more goods and services.

2. The revenue generated by the UBCFS through retail outlets and food producers

If the revenue generated by the UBCFS is maximized, all students who wish to and are qualified to be employed by the UBCFS can be employed. This increase also encourages retail food outlets and food producers to provide more goods and services.

3. The amount of money spent within the UBCFS by consumers.

To encourage the expenditure of consumers' money within the UBCFS, the food system will need to be as affordable as when consumers purchase their groceries outside of the food system and prepare their meal at home.

These indicators are the basis of the following research proposal. They are a foundation to build upon when studying the sustainability of the UBCFS. With the continuum, the indicators, and the following research design the sustainability of the UBCFS can be evaluated.

Research Proposal

Background

Quantitative and qualitative research are two different philosophies. Quantitative analysis associates itself with an objective and hard science concerned with the gathering of numbers and values, whereas qualitative analysis is a subjective measure of observable behaviours and is less concerned with numerical values (8). Qualitative methodologies are supplementary to the quantitative approach which gives the results more depth, rather than broad knowledge of a particular phenomenon (9). Quantitative analysis focuses on one reality, and qualitative analysis focuses on a multiple set of realities. Essentially the main difference between the two is that quantitative analysis counts the beans, whereas qualitative analysis only provides the information on which beans are worth counting (8).

Purpose

The purpose of this research design is to enable future researchers to gauge where the UBCFS falls on the sustainability continuum using both qualitative and quantitative research methods. This study will be a joint effort between the UBC Sustainability Office and future LFC III classes. It is intended for the UBC Sustainability Office, AMS Food Services, UBC Food Services, and the general student body. There are three phases to our research study proposal to take place over four years. A quantitative measure of the UBCFS is to be completed first, and is to be followed by further research to understand the more intricate, ethical and esoteric details of the sustainability of the UBCFS. *Phase one* is a quantitative study over a one-year period, followed by *phase two*, a two-year study of the qualitative aspects of the UBCFS. *Phase three* is to take place in the fourth year of the study and is a data analysis of the overall study.

It is recommended that LFC III 2004 conduct the quantitative aspect of the study, while LFC III 2005 and 2006 conduct the qualitative study on the recruited subjects. The role of LFC III 2007 would be to conduct the data analysis. A majority of the study is to take place within the physical boundary of UBC, while study of off-components will also be necessary.

Phase 1: Quantitative Research - LFC III 2004

During this phase of the study, researchers are responsible for gathering quantitative data from consumers, suppliers, retail food outlets, UBC Farm and UBC Waste Management. Sample questions to be used as part of this research are found in Appendix I. To gather the data researchers are recommended to first conduct research via the internet and relevant publications, and then communicate with the relevant parties to collect additional data. The information gathered should reveal all relevant data that contributes to an inventory of the UBCFS. The raw quantitative data collected is to be stored for analysis at the end of LFC III 2004. Phase 1 sets a foundation of the research study and help researchers of LFC III 2005, 2006, and 2007 better understand the UBCFS.

Phase 2: Qualitative Research - LFC III 2005, 2006

During phase 2, researchers are required to collect qualitative data on the UBCFS. Qualitative research involves extended close contact with the chosen subjects. Strict, non-randomized selection of subjects is required (9). Participants in the study must be members of the UBCFS, available for 3 consecutive years to complete a questionnaire on a monthly basis, and represent the diverse population of UBC. Campus-wide advertisements should be used to attract volunteers for the research. The volunteers will be interviewed and reviewed by the

research panel and suitable subjects will be selected for the study. The prospective subjects must agree to sign a contract in agreement with researchers to ensure the subjects' continual participation. The following lists the subjects required for the study:

25 UBC students who reside on campus (at least one from each residence)

25 UBC students who reside off campus

25 UBC faculty staff who reside on campus (at least one from each residence)

25 UBC faculty staff who reside off campus

25 UBC non-faculty staff who reside on campus (at least one from each residence)

25 UBC non-faculty staff who reside off campus

It is recommended that the research team select more than the desired number of participants for each sub-group to provide a safety margin in case of subject withdrawal from the study. Once subjects have been chosen, they are to be given the questionnaire prepared by researchers based on indicators of sustainability of the UBCFS. The recommended questionnaire can be found in Appendix II. Information regarding affordability, accessibility, and wholesomeness of food should be obtained from the subjects through the questionnaire. Each subject should be contacted monthly by a researcher during the semester of LFC III to complete the questionnaire. On a regular basis, researchers should discuss their recorded findings, observations, comments from subjects, and perhaps suggest ways in which the questionnaire and research study could be improved. A complete record of each researchers' meeting and the completed questionnaires should be kept, as these are essential for data analysis in Phase 3 of the study.

Phase 3: Data Analysis - LFC III 2007

At the end of the three-year research period, all relevant data and contributions are to be analyzed by the research panel. Analysis of information and data collected should be categorized. Expendable data should be filtered, based on whether the data is relevant to our research question. Researchers should look for meaningful associations within the raw data, such as correlations and observable patterns (10). Using this data, researchers can place the UBCFS on the sustainability continuum and determine what issues need to be further addressed in future research.

Conclusions and Recommendations

Completion of the research proposal presented in this study is essential to evaluate the sustainability of the current UBCFS. The results of such a study may then be used to alter the food system so that it progresses along the sustainability continuum, meets the stated goals, and is able to exist long into the future without compromising the health and well-being of future generations. As a result of this study, we have made several recommendations for future study of the UBCFS. We recommend:

- the UBC Sustainability Office continue with its plan to implement an in-vessel composting program. This composting operation will increase the capacity of UBC to compost waste and will also enable the quantity of waste that is composted to be accurately measured.
- that an assessment be done of the available land within the physical boundaries of UBC to determine how much of it is viable for food production as well as how much food this land could produce.

- future LFC III classes work together with the UBC Sustainability Office to conduct this research project. The LFC classes may begin the research and conduct a portion of it each year. However, because of the limited duration of this course, the UBC Sustainability Office will need to be involved in research throughout the remainder of the year.
- future researchers view the goals and definition of a completely sustainable food system as dynamic and able to change over time as UBC and the surrounding community change.

We hope this study and the research proposal we have designed will be utilized by future researchers studying the UBCFS and will contribute to the development of a sustainable food system at UBC.

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APPENDIX I

PHASE 1 SAMPLE QUESTIONS

SUPPLIERS

- What food products do you supply to the UBCFS?
- How far does this food travel to get to the UBCFS?
- How much of the food that is available in the UBCFS is local?
- How much of the food that is available within the UBCFS can be supplied by local producers?
- How much of the food available is organic, whole and minimally processed?

RETAIL OUTLETS/UBC FOOD SERVICES

- How much is spent on food by the students?
- How many grocery stores are there on campus?
- How many foods related operations are there on campus?
- How many students are employed by the UBCFS?
- What are the profits of the UBCFS?
- How many people participate in efforts to reduce waste?
- How much of the food that is brought into the UBCFS can be supplied by the UBC land base?
- How much of the food available is organic, whole and minimally processed? e-s

CONSUMERS

- How many people bring their own reusable cups, containers and cutlery?
- How much is spent on food by the students?
- How many people participate in efforts to reduce waste?
- How much of the waste can be composted versus how much is composted?
- How much of the waste can be recycled versus how much is recycled?

UBC FARM/FOOD PRODUCERS

- How much of the food that is available within the UBCFS can be supplied by local producers?
- How much of the food available is organic, whole and minimally processed?
- How much of the land that is viable for farming is used for food production?
- How much of the food available is organic, whole and minimally processed?

UBC WASTE MANAGEMENT

- How much of the waste can be composted versus how much is composted?
- How much of the waste can be recycled versus how much is recycled?
- What is the total amount of waste from the UBCFS?
- How many people participate in efforts to reduce waste?

APPENDIX II

PHASE 2 QUESTIONNAIRE

UBC SUSTAINABILITY QUESTIONNAIRE

This study is designed to help us determine where we stand in the sustainability of the University of British Columbia. Your input can help us achieve this goal. Please fill out your answers as completely as you can. Your reply will be kept confidential. Feel free to add comments at the end.

Social

1) Are you:

Faculty Staff Student Resident Visitor

2) I prefer to eat organically-grown food.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

3) I prefer to consume whole and minimally processed foods.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

4) UBC has a variety of organic, whole and minimally processed food available.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

5) I think that all food products should be clearly and completely labelled.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

6) Information on all food products and the food system is readily available.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

7) I prefer to consume processed foods because it is readily available.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

8) Food at UBC is of nutritious quality.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

9) Food at UBC is accessible to me (at all times).

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

Economic

10) Food at UBC is affordable.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

11) I'd prefer affordable foods that are whole and minimally processed.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

12) I purchase food at UBC:

Rarely Sometimes Occasionally Frequently All the time

13) Where do you usually purchase your food? (Check all that apply)

- | | | |
|---|---|---|
| <input type="checkbox"/> Trekkers | <input type="checkbox"/> 99 Chairs | <input type="checkbox"/> The Bread Garden |
| <input type="checkbox"/> Sage Bistro | <input type="checkbox"/> Place Vanier | <input type="checkbox"/> Pacific Spirit Place (SUB) |
| <input type="checkbox"/> Totem Park | <input type="checkbox"/> Yum Yum's | <input type="checkbox"/> Arts 200 |
| <input type="checkbox"/> The Barn | <input type="checkbox"/> Edibles (Scarfe) | <input type="checkbox"/> Steamies |
| <input type="checkbox"/> Gage Mini-mart | <input type="checkbox"/> Pages Café | <input type="checkbox"/> Pond Café |
| <input type="checkbox"/> Agora | <input type="checkbox"/> The Village | <input type="checkbox"/> McDonalds |
| <input type="checkbox"/> Other _____ | | |

Ecological

14) I am concerned about the environment.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

15) Composting is available to me at UBC.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

16) UBC has recycling receptacles that are available to me.

0 1 2 3 4
Strongly Disagree Disagree Neutral Agree Strongly Agree

17) Consumers at UBC are encouraged to use reusable cups, containers and cutlery in order to reduce waste.

0	1	2	3	4
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

18) I use reusable cups, containers or cutlery at UBC.

0	1	2	3	4
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

19) I am aware that using a reusable cup or container allows me to have a discount off the original price of food.

0	1	2	3	4
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

20) I am aware that UBC has a farm.

0	1	2	3	4
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

21) I think UBC should grow its own food within its physical boundaries.

0	1	2	3	4
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

22) I would buy food that UBC produces.

0	1	2	3	4
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree