Developing the AMS Food Preservation Workshop Series

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Executive Summary

The “Developing the AMS Food Preservation Workshop Series” project was completed as a Directed Studies project through the Social Ecological Economic Development Studies (SEEDS) Program at the University of British Columbia (UBC) in Vancouver, BC. The Alma Mater Society (AMS), the governing student body at UBC, was interested in developing this workshop series as a way to enact institutional sustainability policies, extend seasonality of local produce, increase the amount of local food used in the AMS food outlets, and teach the UBC community about food preservation and food safety. These goals align with other programs, such as Farm-to-College food education skills programs, that aim to address some of the food system issues, such as unsustainable food distribution networks and peoples’ disconnection from their local food system, that communities are facing today, such as unsustainable food distribution networks and peoples’ disconnection from their local food system. The purpose of this project was to develop the basic theoretical background and basic resources for the AMS to start the food preservation workshop series by devising a framework for both the theory and content of the series, developing a tool-kit to launch the workshops, and creating content for the pilot workshop in the series. The methods used in this project were twofold; one component was to determine the direction of the project and the other was to develop the content of the project. These were done by interviewing and conducting meetings with the primary stakeholder, the Executive Chef of the AMS, and the other members of the project team to determine the direction, scope, and vision of the project as well as by reviewing the context of the project, similar programs that exist at other institutions, and information about the food preservation techniques. It was found that a gap in similar programming exists and that the AMS can fill this gap, increase its environmental sustainability, and enact sustainability policies through offering these workshops. In addition, the basic framework and resources to launch the workshops were developed. It is recommended that the tools developed in this project be used to launch the series and implement the pilot workshop proposed in this report, and that further projects and research be done to assess the impacts and success of the workshops.

Introduction

This project was conducted by a student at the University of British Columbia (UBC) in Vancouver, BC through the Social Ecological Economic Development Studies (SEEDS) Program for Directed Studies credit. The Alma Mater Society (AMS), the representative body for students at UBC, was the main stakeholder and partner for this project. Part of the services that the AMS offers to UBC students are food outlets at the UBC Vancouver campus (UBC AMS, n.d.). The AMS has policies surrounding sustainability within its food operations; this project aimed to develop the framework for a series of food preservation workshops to improve sustainability within their operations and address food sustainability issues on-campus.

Context

Food System Sustainability

Today, one of the major challenges that communities around the world are facing is food system sustainability. Phenomena that have occurred in the last century, such as the industrialization of agriculture, the globalization of trade, and the corporate consolidation of the food supply, have led to a disconnect between people and the food that they eat (Weibe and Widf, 2011; Chenhall, 2010). These processes have also led to environmentally unsustainable agricultural practices, an energy intensive food distribution network, and unjust outcomes for many people around the world (Weibe and Widf, 2011). Much of the food that people eat in developed countries comes from faraway places and is sold in grocery stores, which is often unsustainable because of the way the food was grown, processed, and or transported to someone's plate (Weibe and Widf, 2011). These easy and convenient ways to obtain food have led many people to become disconnected from food preparation and processing practices, such as home food preservation (Chenhall, 2010).

Farm to School and College Programs

In light of the major environmental and social challenges facing our food system today, citizens, communities, organizations, and governments have begun to develop initiatives to address food system issues and to improve the resilience and health of our

food system. As identified by Ng, Bednar & Longley (2010), one of the developments to counteract food system issues has been the growth of Farm-to-School or Farm-to-College (FTC) programs. FTC are "program[s] to serve locally produced foods from area farmers in institutional cafeterias and educate children, students, adults and communities about local food and farming" (Sanger and Zenz, 2003, p.iv). FTC programs can be key components in creating sustainable foodservice operations at colleges and universities, as well as an important method for foodservice managers to promote environmentally sustainable food consumption (Ng et al., 2010). Additionally, FTC programs that procure local food for consumption on campus, in conjunction with educational programming about local and seasonal foods, have been recommended as a way to improve food system sustainability (Ng et al., 2010).

An example of a FTC program in British Columbia is at the University of Victoria (UVic) in Victoria, BC. In 2011, UVic's Food Services Department had an agreement to increase the amount of produce purchased from a local food distributor, which sold produce from farmers in the Victoria region and across BC, to 65.84% of the total purchases (Donatelli and List, 2011, p.13). This represents "a dramatic shift in their food purchasing policies and practices in the last few years" (Donatelli and List, 2011, p.17). These shifts can be attributed to university policies that promote social and environmental sustainability in their institutions, as well as leadership from key players in the UVic Food Services and Sustainability operations.

As identified by Bellows, Dufour, & Bachmann (2003) in a resource guide of Farm-to-Institution programs, another example of a successful FTC program is at the University of Montana (UM) in Missoula, Montana. The UM University Dining Services (UDS) started purchasing local food in 2003 and has since been able to spend more than 20% of their food budget on local products and purchase products from 120 local farmers, ranchers, and businesses (Bellows, et al., 2003, p.5). One of the challenges that the UDS faced was the ability to process food and then store it year round. To address this UDS purchased equipment to make their own hamburger patties, equipment to vacuum pack and freeze products, and built a facility with freezers and dry storage where food can be stored.

Food Skills

Many of the previously mentioned phenomena that occurred in the food system in recent decades have influenced how people interact with food. A transition has been observed "...in cooking and food preparation skills [that] involves the increased use of pre-prepared, packaged and convenience foods, which require fewer and/or different skills than what is often referred to as traditional or 'from scratch' cooking" (Chenhall, 2010a, p.1). In a review of literature on food skills of families in Canada, Chenhall (2010a) found that "most adults were not skilled in freezing or canning foods…" (p.26). This lack of engagement with food and lack of confidence in food skills has implications for food system sustainability, as cooking, and particularly preserving, can be a significant way to increase demand for local, seasonal, fresh, and high-quality food. This transition of food skills is also related to lack of educational opportunities about cooking and food preparation (Chenhall, 2010a, p. 10).

In a review of programs that aim to improve food and cooking skills in children and families, Chenhall (2010b) profiles *Food Skills for Families*, a program in BC led mainly by the Canadian Diabetes Association. This program is for families in vulnerable populations in communities all over BC and focuses on improving skills around healthy cooking. It was found through evaluation of the program that participants ate more fruits and vegetables, felt more confident about their food skills, and prepared more food from "scratch" (Chenhall, 2010b, p. 17), which shows the potential effectiveness of community food skills education.

UBC and the AMS

Here at UBC, the AMS has made sustainability an important aspect of their operations (AMS Sustainability, 2014). In 2008 the AMS adopted the Lighter Footprint Strategy, which guides the AMS's actions on increasing the environmental justice and sustainability within their operations, including their food and beverage retail outlets (AMS Student Society, 2008). Within the framework of the Lighter Footprint Strategy, AMS Food and Beverage aims to increase the sustainability of their operations by sourcing food that is as local and seasonal as possible, by supporting learning about food-

related issues, and by bringing positive changes in the food system through community engagement (AMS Sustainability, 2014).

Part of the AMS Food and Beverage sustainability mandate is to support teaching and learning about food sustainability and to foster positive food system changes through training and community events (AMS Sustainability, 2014). Currently, AMS Food and Beverage operates out of the Student Union Building (SUB) at the UBC Point Grey campus. A new SUB, the "Nest," is being constructed and is due to be completed in the spring of 2015. The changes to the SUB, which include two new commercial kitchens for AMS use, will increase the capacity of the AMS to host food related workshops, projects, and educational opportunities (Bissell, personal communication, September 10, 2014). The new Executive Chef of AMS Food and Beverage, Ryan Bissell, will be the staff member managing the operation of these kitchens, as well as spearheading educational opportunities. Bissell hopes to increase the sustainability of their food operations while creating opportunities for education within their business. Bissell's vision for the AMS is to produce, process, or make 80% of the products that it serves at its food outlets (Bissell, personal communication, September 10, 2014), an ambitious goal that can only be achieved through innovative food production and processing methods.

The AMS Food Preservation Workshops

In congruence with the growing movement to increase Farm-to-College programs and education regarding food skills, one of the identified means of achieving the AMS Food and Beverage sustainability goals is to provide educational opportunities to the UBC community about food preservation techniques, specifically canning, through on-campus workshops. Educational workshops about canning would help provide the AMS with a yearlong supply of seasonal and local foods, which will help achieve their environmental sustainability goals, and provide an opportunity to teach members of the UBC community about tangible food skills. Increasing the supply of environmentally sustainable food to the AMS and spreading food preservation knowledge and skills can contribute to increasing the sustainability of the UBC food system, as well as contribute to the larger movement to increase local and global food system sustainability.

Institutional Context

The AMS Food Preservation workshops present an opportunity to achieve institutional goals within the AMS and UBC at large. The AMS Lighter Footprint Strategy is the guiding document for the AMS's sustainability practices and provides a framework for many of their operations' actions. This series of workshops can help fulfill the goals that are outlined in the Food and Beverage portion of the AMS Lighter Footprint Strategy mainly by increasing the amount of local produce used in the AMS food operations, but also by potentially increasing the amount of produce purchased from the UBC Farm and by eventually scaling up the workshops to a larger scale (AMS Student Society, 2008). See Appendix A for a table detailing the project's relation to the AMS Lighter Footprint Strategy.

The Food Preservation Workshops can also contribute to improving the food system of UBC as a whole. The UBC Food Systems Project is a collaborative research project that is a part of the larger UBC Sustainability campus initiative (UBC Sustainability, n.d.). The UBC Food Systems project aims to improve the sustainability of the campus food system and has outlined a vision statement of the principles that could govern a sustainable campus food system (UBC Sustainability, 2011). The AMS workshops again can help the UBC campus food system achieve this vision by increasing the environmental sustainability of the food served on campus by providing more local food in AMS food outlets. The workshops can also help achieve the goals of reducing waste, transportation emissions, and packaging by creating an in-house supply chain, where food that is grown on campus (at the UBC Farm) is then processed and consumed on campus (UBC Sustainability, 2011). The workshops can also contribute to the vision of community engagement in the food system and the opportunities to access to education about food production and processing (UBC Sustainability, 2011). For the full list of the vision statement goals that relate to the food preserving workshops, see Appendix B.

Lastly, the food preservation workshops align with some of the goals in the higher level of UBC institutional plans. These workshops can help create a vibrant social community at UBC by providing informal educational experiences and opportunities for social engagement, as well as contributing to the overall environmental sustainability of the campus. See Appendix C for a list of relevant UBC institutional documents.

Project Rationale and Purpose

What is Food Preservation?

Food preservation is a way to increase the shelf life of raw food products by eliminating the possibility of spoilage and ensuring the safety and quality of the products. This is done through processes that eliminate threats, such as microorganisms or enzymes, which can make food inedible, low in quality, or unsafe (USDA, 2009). These processes include freezing, dehydrating, pickling, canning, and many more (see Appendix D for a list of food preservation techniques). Food preservation is important because fresh food is not available throughout the year in Canada; some foodstuffs must be preserved to ensure that a safe and nutritious supply of food is available year round (Ministry of Agriculture, Food, and Rural Affairs, 2013).

Canning is a method of preserving fruits and vegetables that can be done easily at home or on a small scale. Today, canning is a large industry but has recently become more popular in smaller operations as people and businesses have become more interested in locally produced and environmentally sustainable food (Public Health Ontario, 2014). If done correctly, canning preserves food by sealing and heating processed food in air-tight jars, which prevents microorganisms from spoiling produce and by maintaining produce quality and nutrients (USDA, 2009). Freezing and dehydrating are also common methods of food preservation because of their ease and convenience by food preservers.

Canning - Increasing Demand for and Use of Local and Seasonal Foods

Canning can ensure a source of food throughout the year by preserving fresh fruits, vegetables, or other food products when they are in season. Procuring and preserving locally produced food when it is in season and abundant extends the season of the food by making it possible to eat the food throughout the year (FarmFolkCityFolk, 2014). This has environmental benefits, as food has to be transported over shorter distances from farm to plate and preserved food can be eaten after the growing season is over instead of requiring the purchase of food that is imported from far away, which both reduce energy and fossil fuel use associated with food (FarmFolkCityFolk, 2014).

Purchasing locally produced food can also contribute to economic sustainability. Buying food from local farmers can help boost activity in the local economy, also known as the "multiplier effect" (Metro Vancouver, 2011). The multiplier effect is the idea that if money is spent locally, the money will circulate within the community and have more benefits for the community than if the money was spent on something imported from elsewhere. This effect is seen "because a locally owned business is more likely to purchase inputs from local suppliers who will then also have more to spend locally" (Metro Vancouver, 2011, pg. 29).

Why canning?

For these reasons, preserving food can help the AMS achieve its goal of providing local and sustainable food in its food outlets. By procuring locally grown fruits, berries, or vegetables when they are in season and canning the produce, the AMS can create a supply of local and sustainable food all year long. See Appendix E for a calendar of seasonal produce and when it can be preserved. The AMS also freezes and dehydrates produce as a means of food preservation; canning can augment these methods and provide a more diverse set of preserved foods throughout the year.

Canning can be done on the small scale for businesses and can be a satisfying activity for people to do at home. This makes canning workshops a good option for the AMS, as it provides an opportunity for the AMS to preserve food for its operations while providing education and food skills opportunities for the UBC community.

Project Purpose

The purpose of this project is to develop the theoretical background and basic resources for the AMS to start a food preservation workshop series. This was done by:

1. Devising a framework for both the theory and content along with a tool kit to launch an AMS Food Preservation Workshop Series
2. Creating content for the first workshop in this series

Methods

The Project

The main method used in the project was interviews with the key stakeholder and partners involved in the project. The primary stakeholder was Ryan Bissell, the Executive Chef of the AMS, because the end result of this project will be used and implemented by him and his staff. The other participants included the AMS Sustainability Coordinator, the SEEDS Manager, the faculty advisor, and me, the student researcher. An initial meeting was set with all of the project partners in September to determine the basic outline of the project, while acknowledging that it was likely to change throughout the semester. A second group meeting was scheduled a month later in October to reassess the project at that time. After that, the whole group met almost every other week, while individual meetings between one of the other participants and me were held every week to work out and discuss the more detailed aspects of the project.

The group meetings with all the participants were used to determine the direction and scope of the project. Those meetings involved discussing what this project would cover, the content and form of the workshops, the reasons for putting on the workshops, and the deliverables of the project, as well as reviewing the work that had been done for the project so far. New ideas and changes to the direction and scope of the project were discussed at these meetings, as the project was continually evolving based on the work that I was doing and new information that came up from the other participants. A consensus process emerged at the meetings, as issues or changes were brought up and everyone discussed them before coming to an agreement on the new form, direction, or content of the project.

Initially, it was determined by the group that I would be developing the umbrella framework for the Preserving Workshops program, as well as the logistics of running the pilot workshop in spring 2015. However, over the course of the project it was decided that I would focus on the theoretical framework, background, and basic materials for the workshops instead of the operational logistics of the pilot workshop. This was because the pilot workshop would not be held until the spring term and we hoped that another student from my faculty (Faculty of Land and Food Systems) would continue the project and be able to help plan and run the first workshop in the next academic term. It was also decided that I would narrow the scope to the theoretical framework and basic materials because that turned out to be enough work for the three credits I would be receiving.

Individual meetings with the project participants were mostly used to get specific kinds of help with the project. An individual meeting with Bissell consisted of discussing the logistics of the first workshop (while that was still a part of my project) and going on a tour of the New SUB to see the kitchen spaces where the workshops would be held. A meeting with the SEEDS Manager was used to help sort through the materials I had produced and desired outcomes for the participants, as well as to clarify the form of the project deliverables. Individual meetings with my faculty advisor consisted of reviewing and revising the content of the work I had done so far. This was helpful because the faculty advisor's academic career focused partly on food microbiology, so his expertise was very useful when reviewing the scientific food preservation content of the materials. The one-on-one meetings were productive for discussing the more detailed and specific aspects of the project, while the group meetings were necessary for determining the overall scope of the project.

The Content

The other component of this project was to develop the content of the theoretical background and framework and the basic materials for the project. This was done by reviewing information about the AMS and UBC context of the project, reviewing similar programs that are offered elsewhere, reviewing the methods and science of canning, and reviewing relevant academic literature pertaining to food system sustainability.

When researching the context of the project, I mainly reviewed the AMS Food and Beverage website, the AMS Sustainability website, and the AMS Lighter Footprint Strategy. Additionally, I searched the SEEDS Program library for previous student projects that were related to the AMS Food and Beverage operations or Farm-to-Institution programs.

To research similar canning programs or workshops that are offered elsewhere, I searched for resources mainly on Google and Google Scholar. I searched many terms and combinations of related words, such as "university canning workshops," "food preservation workshops," or "university students' food preservation workshops." I searched on Google Scholar, as well as UBC Summons, to see if there was any published literature on these types of workshops. I also searched on Google because I wanted to

find non-academic information about canning workshops, since information about similar workshops would likely not be found in published academic literature. Different universities or colleges with strong agriculture or food science departments were discussed at the group meetings, so those also provided direction for researching similar programs.

Another component of the research process was reviewing information about the actual process of canning and food preservation. I mainly used Google to search for information on home canning, which generated websites from the Canadian government, the US government, and both Canadian and US universities. From there, I based most of my review on the government and university websites and information, since this information is scientifically sound and safe for people to use, more accessible than academic literature, and more appropriate for the context of the workshops.

In addition to the content on the process of home canning, I reviewed relevant academic literature on food system sustainability and food skills. This content was used mainly for my written academic report but was also adapted to be used for the background information in the workshop presentation. To find this literature, I searched Google Scholar and UBC Summons for terms like "food preservation skills." I also looked for sources used in related previous SEEDS project reports and looked at syllabi from food systems courses I have taken in the past.

Findings

Gap in Programming and Communication

Few current programs offer hands-on canning workshops to university students and communities

From the review of similar programs (see Appendix F), it was determined that there is a gap in programming that the AMS Food Preservation Workshops can fill. There were a handful of universities with food and agriculture programming similar to UBC that offered canning workshops in past years, but there was a lack of information on current workshops that offer university students, staff, and faculty a hands-on opportunity to learn how to can food products. There are universities that currently offer food science courses that teach about food preservation, but these might not be accessible to students

and community members who are interested in hands-on, take-home skills rather than in-depth scientific information.

Additionally, there are universities in the US that have extension offices that offer canning workshops; extension offices are bodies associated with land-grant universities that are meant to help distribute information from universities to a wider audience of members in related professions as well as in the wider community. While these extension offices have canning workshops, they are not necessarily offered at university campuses and are not necessarily meant to be consumed by students or the local university community.

There is a lack of centralized and recorded information about similar programs held in the past

A related aspect of the gap in programming is that in addition to few current programs, there is a lack of detailed and centralized information about similar canning workshops that were offered in the past. An example of this is the UBC Farm, the student run farm at the UBC Point Grey campus. The UBC Farm used to offer canning workshops in its early stages but there is no official record of them and they do not currently offer canning workshops (Amy Frye, personal communication, September 18, 2014).

Some universities have the capacity for in-house food preservation but do not offer educational opportunities for the university community

Additionally, there are universities, such as the University of Guelph, that have the capacity to do in house food preservation, but they do not seem to use these facilities to offer educational opportunities about food to the university students or community (Hospitality Services, 2014, p.4).

Vision for the AMS Food Preservation Workshops

Many ideas and visions for the workshops were generated through the group meetings. These were synthesized into the following mandate and proposal for the workshops.

Project or Workshop Mandate

Based on the evaluation of the UBC and AMS context and the reasoning behind food preservation, the project and/or workshop mandate reads:

The AMS Food Preservation Workshops will provide an educational opportunity to the UBC community while increasing the sustainability of the AMS Food and Beverage operations by hosting workshops that teach about food preservation techniques and that in turn increase the amount of local and sustainable products that can be used in the AMS food outlets throughout the year.

Workshop Series Proposal (also found in Appendix G)

Vision

- To provide UBC students, staff, and faculty with the opportunity to learn hands-on food preservation skills and food safety knowledge
- To provide the AMS with a way to extend seasonality and increase local food used in AMS food outlets

Audience

These workshops will be offered to the general UBC community. Workshops will accommodate around 12 students at maximum and would ideally have a variety of community members attend them.

- Primary audience: UBC students
- Secondary audience: UBC faculty and staff

Learning Outcomes

The workshops will teach participants about a variety of subjects and will provide people with tangible skills that they can take home and use to preserve their own food, such as:

- Seasonal and local foods
- Food preservation techniques, mainly for fruits and vegetables
- Sound food safety practices
- Awareness of food system issues surrounding local and seasonal foods

Workshop Types

The series can be made engaging by offering workshops on many different types of preservation, from canning jams or sauces to pickling whole vegetables. They can offer intercultural engagement and food preservation techniques, such as making kimchi or pickled eggs. Eventually, different levels of workshops can be offered, from basic 101 courses that preserve simple fruits or vegetables, to advanced workshops that teach

participants how to pickle meat or other meat processing techniques (see Appendix H). The workshops can also have fun themes, such as "Holiday Gift Canning."

Workshop Facilitators

The workshops will be led by Executive Chef Ryan Bissell or the other AMS chefs.

Workshop Timeline

The pilot workshop will be held in spring of 2015, likely in March. If the pilot is successful, the workshops can be held throughout the summer and early fall (the main growing season). The workshop series might be offered a few times a season at the start, but could expand to a weekly series that run all year long depending on the capacity of the AMS. In addition, if the workshops prove to be successful, they could be expanded to include processing for UBC Food Services, the other major food provider on the UBC-Vancouver campus, in the future. This would contribute to increasing food sustainability at UBC in a longer timeframe.

Communication

The workshops will have to be promoted to the UBC community. Responsibilities could be divided as such:

- AMS Communications: develop design for communication materials (posters, webpage); promote workshops
- AMS Sustainability: help design webpage; coordinate registration; promote workshops
- AMS Food and Beverage: work with partners on communication content and design; promote workshops

The workshops could eventually be filmed and distributed as a series of webinars. There is also the potential that these workshops could be expanded to an off-campus series in the future through Bissell's chef network.

Outputs

During each workshop, participants will can multiple jars of food. Each participant will take home one jar and the other jars will be kept by the AMS to use in their food outlets. Initially, most of the food that will be preserved by the AMS and at these workshops will go to The Perch, a fine-dining restaurant that will be located on the roof of the New SUB. Eventually, the project could be scaled up to provide food for many of the AMS food outlets, thus increasing the sustainability of the AMS Food and Beverage on a larger scale.

Budget

A budget will be needed to obtain workshop supplies, such jars, labels, printing materials for the participant manuals, and produce. There will be no budget needed for human resources as they will be a part of chefs' allocated work hours. The goal is for the workshop to be a cost-recovery model whereby workshop participants pay a small fee to cover the costs of the product they take home. The budget for the workshop can possibly be covered by funds from AMS Sustainability, provided an application for funding is submitted.

Logistics

A structure for charging for the workshops as an AMS event will need to be determined, namely which account the money will go to. It is also possible that a waiver would need to be created to cover legal liability. These two aspects can be coordinated with AMS Sustainability.

Development of the workshop kit

The final segment of the project was the development of a workshop kit that can be used in the pilot workshop and the workshops to come. This kit includes the basic materials to for the workshop facilitator to present, as well as take home materials for the participants. This kit was developed from the review of government and university documents on the procedure home canning and from my review of academic food sustainability and skills literature. This kit includes:

1. A script for the chef or facilitator to use in the workshop (see Appendix I)
2. A PowerPoint presentation for the chef or facilitator to use in the workshop (see Appendix J)
3. A canning manual for workshop participants to use and take home (see Appendix K)
4. An adapted pickled carrots recipe for use in the pilot workshop (see Appendix L)

Discussion

The proposed vision of the AMS food preservation workshop series has the potential to fill the gap in related programming. The workshops can fill this gap through providing hands-on education about food preservation to the UBC community while increasing the environmental sustainability of the AMS Food and Beverage operations. This would be done by utilizing the new AMS kitchen facilities to not only preserve food

for the AMS operations, but to teach UBC students and the UBC community how to can and preserve food. The proposed vision can further fill the gap by offering an ongoing workshop series and by recording and tracking the information about developing and implementing the workshops in a centralized and easily accessible place.

By offering these workshops the AMS has the potential to contribute to strengthening food system sustainability at UBC and in the wider Metro Vancouver community. This would be accomplished with the increased amounts of local and environmentally sustainable food served at UBC, the spread of food preservation education and food skills in the UBC community, the fostering of campus culture around good food, and the support to local farmers and the local economy that would accompany these workshops. These positive impacts would align with the sustainability policies outlined by the AMS, as well as the vision of a sustainable campus food system outlined by the UBC Food Systems Project (see Appendices A and B).

These potential impacts parallel the work that is being done in related Farm-to-College and food skills programs. Similar to the food procurement programs at the University of Victoria and the University of Montana, implementing the workshops would show that sustainability policies are being acted upon at UBC and that educational institutions can take an active role in promoting sustainability. Both university food services were able to increase the amount of local food purchased and used on their campus' and the University of Montana was even able to increase its capacity to process and store food; outcomes which were identified to have positive environmental and economic impacts (Donatelli and List, 2011; Bellows, et al., 2003). These mirror the current context of the AMS and demonstrate that the AMS can join the movement in promoting and enacting food system sustainability.

Similar to the Farm-to-College programs, the AMS can also provide a means for people to regain food skills. Although the reports by Chenhall (2010a,b) reviewed food skills in the child and family context, their implications can be applied to university students, staff, and faculty also regaining lost food skills. By regaining food preservation skills, the university community could increase its demand for local and fresh food. This would again have positive impacts on sustainability by decreasing the demand for imported and processed food.

These workshops could also potentially have global impacts. There are many international students at UBC who could participate in these workshops and then take the knowledge back to their home countries. This could be especially impactful in developing countries, where food processing can be an important part of agricultural and economic development (UNIDO, 2004).

However, a crucial part of these workshops having impacts on the wider community would be to make the information about the process of developing and implementing the workshop series available and easily transferrable so it can reach a wide audience. This could be especially important if other universities or institutions would like to start similar programs to strengthen their own local food systems.

Discussion of the Process

What Worked

One of the aspects of completing the project that worked well was the different kinds of meetings. The group meetings were helpful in determining the direction, vision, and scope of the project, while the individual meetings were helpful for working out details, sorting through the content discussed in group meetings, and making revisions to the content of the project. Both kinds of meetings were important for the process of the project.

The other aspects of the project that worked well were the structure of the SEEDS Program and having support from the whole project team. Having a clear baseline project description to work from and being able to meet with the project team often made the project development smooth and easy to complete.

Challenges

One of the challenges of the project was gathering direction from the group meetings. Although there was a clear project description, the deliverables and form of the project were fairly nebulous at the start, so gathering direction from the discussions at the group meetings was somewhat difficult. This became easier once the scope and deliverables were more established. Similarly, it was difficult to determine which sources were appropriate to use in developing the project and to balance using academic literature and other types of information. But again, this became clearer as the deliverables of the

project were solidified.

Recommendations

Next Phase of the Project:

- *AMS Food and Beverage*
    - Implement the pilot workshop proposed in this report

- *AMS Sustainability/SEEDS Program*
    - Launch the second phase of project, which will focus on the operational aspects of pilot workshop

- *SEEDS Project Student Researcher*
    - Develop the budget and operational logistics for the pilot workshop
    - Apply to AMS Sustainability for funding to cover the costs of the workshops
    - Research similar food preservation programs or canning workshops in Vancouver
        - Interview people who put on similar workshops to see if they have recommendations on how to run workshops
    - Research if there is any theory or pedagogy on how to make workshops engaging
    - Develop more food safety/recipe plans for future workshops

- **Future SEEDS Projects - collaboration between AMS Food and Beverage, AMS Sustainability, SEEDS Program, and student researchers**

    1. Implement a student project to develop a platform for communicating about the workshops
        - Track and record the process of establishing and running the workshops
        - Make this information easy and accessible for other people to find
        - If it becomes a regular, on-going program, consider making webpage where resources/information about the program can be found, such as the final SEEDS reports or descriptions of the workshops that are offered

    2. Implement student projects to develop tools to assess the impact or success of the workshops, such as:
        - A satisfaction survey for workshop participants
        - A food security assessment survey for participants
        - An analysis of the impact of the workshops on amount of local food used by the AMS
        - A nutritional assessment of the canned goods produced in the workshops

- An environmental impact assessment of the canned goods produced in the workshops compared to conventional or store-bought organic canned goods
- Test the pH of all the canned goods produced in the workshops

3. Implement a student project on how to scale up the workshop series
    - Look into creating partnerships/opportunities to expand the program to UBC Food Services or other organizations

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Appendix

APPENDIX A - The AMS Food Preservation workshops in relation to the AMS Lighter Footprint Strategy

AMS Lighter Footprint Strategy Goal	AMS Lighter Footprint Action	How the Food Preservation workshops help
a) Significantly reduce the average per-serving ecological footprint of food and beverages sold at the AMS food outlets (Internal AMS target; goals it can achieve within its own operations)	• Set informed targets for increasing the purchase of local food ingredients as a percentage of total food purchases • Increase proportion of items procured from UBC Farm and strengthen relationships with other local producers • Significantly increase the number of certified organic, fair trade and GMO-free ingredients used by the AMS food outlets	By increasing the amount of local produce that is used in the AMS through preserving local food when it is in season (instead of purchasing preserved food from elsewhere)
a) Encourage UBC Food Services to significantly reduce the ecological footprint at all of their food outlets, including franchises. (Interactive Target; goals it can help the UBC Food Services to achieve)	• Actively support and work with professors and students on food systems projects	By engaging the UBC population with the preserving workshops and potentially scaling the project up to UBC Food Services in the future
b) Work with student groups, the UBC Farm, and the UBC Sustainability Office to improve food security by increasing the amount of local food produced on campus and in the Vancouver community. (Interactive Target; goals it can help other groups achieve)	• Investigate ways for the AMS to support the UBC Farm in its food production initiatives	By purchasing large amounts of seasonal produce from the UBC Farm for the workshops

APPENDIX B - The AMS Food Preservation Workshops in relation to the UBC Food Systems Project "Vision Statement for a Sustainable UBC Food System"

Principle	How the workshops help
1. Food is produced in a way that upholds the integrity and health of ecosystems (including aquatic ecosystems) and does not disrupt or destroy ecosystems	By purchasing food from known farmers that use sustainable growing methods
3. Food is locally grown, produced and processed in support of local people, infrastructure and economies	By purchasing produce from local farmers and processing it locally
4. Food is culturally and ethnically appropriate, affordable, safe, nutritious and minimally processed	By offering low-cost workshops that preserve a diversity of foods
5. Providers and educators promote awareness among consumers about cultivation, processing, ingredients, and nutrition of food products in the food system	By offering and promoting the workshops
6. Food and the food environment enhance community through opportunities for community members to interact and support one another to meet common interests and goals	By offering and promoting the workshops
7. Food is produced in a socially responsible manner, such that providers and growers pay and receive fair prices for their products and have safe and humane working conditions	By purchasing from local known farmers
8. There is zero waste produced by the system, in that waste is reduced to the greatest extent possible and what waste is produced is composted or recycled locally	By minimizing package from purchased canned/preserved goods; by reusing jars
10. On-campus food system actors work toward food sovereignty and agency, within the context of the wider food system	By producing their own supply of canned goods
11. On-campus food providers work with off campus distributors and wider food system actors to transition to a more sustainable system, especially in the areas of transportation emissions, packaging and local and fair procurement practices and where possible positively influence food system policy beyond the University	By reducing transportation and packaging and promoting local procurement; by spreading the workshops through off-campus channels
12. Any student, staff, or faculty member desiring the opportunity to learn about food production and preparation will have access to such opportunities through on-campus land- based food production sites.	By offering and promoting the workshops

APPENDIX C - The AMS Food Preservation Workshops in relation to higher-level UBC Plans

Document	Goal	Action	How the AMS Food Preservation Workshops contribute to achieving these goals
UBC Climate Action Plan[1]	(2) Defining, and then increasing supply of and markets for sustainable food on campus (4) Reducing wastes from the food system (working towards eliminating the concept of 'waste' in our food system entirely, so that it is viewed as a resource or input)	FO-03 Engage UBC food providers in building a network with local producers to increase sourcing of local food FO-10* Reduce packaging waste from the UBC food system FO-13 Undertake a feasibility assessment for an on-campus food processing facility	By increasing the supply of sustainable food on campus and by promoting more connections with local producers By reducing the waste from purchasing canned goods from other sources By testing out what food processing could look like in the campus context
UBC Strategic Plan: Sustainability[2]	**Goal 1:** Make UBC a living laboratory in environmental and social sustainability by integrating research, learning, operations, and industrial and community partners	**Action 1:** Make UBC an agent of change through innovation, integration, demonstration and inspiration	By integrating learning in informal educational opportunities with AMS Food and Beverage operations By offering innovative and unique educational programming to the UBC community

1. The University of British Columbia. (2010). Climate Action Plan. Vancouver, BC: The University of British Columbia. Pg.29. Retrieved from: http://sustain.ubc.ca/sites/sustain.ubc.ca/files/uploads/CampusSustainability/CS_PDFs/PlansReports/Plans/UBCClimateActionPlan.pdf
2. The University of British Columbia. The UBC Plan: Sustainability. Retrieved from: http://strategicplan.ubc.ca/the-plan/sustainability/

APPENDIX D – Table of Different Methods of Food Preservation

	BASIC HOW TO	HOW IT PRESERVES	BENEFITS	DRAWBACKS
FREEZING[1]	• Use fresh food and freeze quickly • Blanch produce (if recommended) • Package and seal food well in airtight container; reduce exposure to air • Store packaged food in freezer at 0°F or lower	• Food is kept safe from spoiling while frozen • Freezing stops microorganisms (bacteria, etc.) and slows down enzyme reactions that degrade food • Blanching stops enzyme action that degrades quality	• Easy and quick • Works for most foods • Blast freezing (commercial method) does not create large ice crystals in produce	• Limited freezer space • Reliant on energy source; spoilage can occur if freezer breaks/stops • Slow freezing (at home method) and exposure to heat creates large ice crystals and punctures produce cell walls; creates shrunken appearance
DEHYDRATING[2]	• Process produce (wash and blend or cut produce) • Dry out produce in electric dehydrator or oven set at 80-160°F, or outside in the sun (fruits) • Store dried food in dry and airtight containers	• Removes almost all water content from produce • Removal of water inhibits growth of microorganisms and enzyme actions	• Easy and safe • Some foods (fruits) can be done with solar energy in hot and low humidity conditions • Freeze and spray drying can be done on a commercial scale	• Requires processing and time • Trial and error process to determine best combination of air circulation, heat, and air dryness
CANNING[3]	• Wash and peel or blanch fresh produce • Process food by heating or cooking; add acid (lemon or vinegar) depending on the type of food • Put processed food in sterilized jars with metal, sealing lids • Seal jars in a pressure canner or boiling-water bath canner, depending on type of food	• Canning eliminates spoilage by removing oxygen, destroying enzymes, and preventing the growth of undesirable microorganisms • Processing food at high temperatures for the right amount of time destroys microorganisms • Properly sterilized and sealed jars keep microorganisms and oxygen out of food while being stored	• Most foods can be canned; a wide variety of products can be preserved	• Improper practices can lead to the growth of botulism, a toxic bacteria • Requires that people follow directions precisely • Requires equipment • Can be time consuming
PICKLING[4]	• Use freshest produce possible • Add vinegar to produce, depending on recipe • Use vinegar that's content is at least 5% acetic acid • Put in sterilized jars and refrigerate or process in a boiling-water bath	• Acid in the vinegar solution inhibits the growth of harmful microorganisms • Canning or refrigerating allows pickles to be kept safe from spoilage while being stored	• Pickling is not very difficult • Boosts flavor of produce	• Can be time consuming • Pickles can turn out low quality if produce is not fresh and recipes are not followed

1. National Center for Home Food Preservation. (n.d.) How do I? ...Freeze. National Center for Home Food Preservation, Retrieved from: http://nchfp.uga.edu/how/freeze html
2. National Center for Home Food Preservation. (n.d.) How do I? ...Dry. National Center for Home Food Preservation, Retrieved from: http://nchfp.uga.edu/how/dry.html
3. National Center for Home Food Preservation. (n.d.) How do I? ...Can. National Center for Home Food Preservation, Retrieved from: http://nchfp.uga.edu/how/can_home.html
4.National Center for Home Food Preservation. (n.d.) How do I? ...Pickle. National Center for Home Food Preservation, Retrieved from: http://nchfp.uga.edu/how/can6b_pickle.html

APPENDIX E – Calendar of Seasonal Produce

Adapted from FarmFolkCityFolk: Get Local in Southwest BC*

Type of workshop	Produce	Months Available or in Season in Vancouver In season / In greenhouse / In storage											
		J	F	M	A	M	J	J	A	S	O	N	D
Pickling/ Fermenting	Asparagus												
	Beans												
	Beets												
	Cabbage												
	Cauliflower												
	Carrots												
	Cucumbers												
	Garlic												
	Onions												
	Radish												
Canning (fruits, jams, jellies)	Apples												
	Apricots												
	Basil (pesto)												
	Blackberries												
	Blueberries												
	Cilantro												
	Cherries												
	Crab Apples												
	Cranberries												
	Dill												
	Kiwi												
	Mint												
	Nectarines												
	Peaches												
	Pears												
	Plums												
	Pumpkin												
	Raspberries												
	Strawberries												
	Tomatillos												
	Tomatoes												

*http://www.getlocalbc.org/wp-content/uploads/2010/08/MetroVan-Seasonal-Chart.pdf

APPENDIX F - Programs Similar to the AMS Food Preservation Workshops

University/Location	Program Name	Type of Programming	Current?
UBC Farm – Vancouver, British Columbia	Growing Season Workshop Series[1]	Offers workshops about food skills, with some food preservation mostly via fermentation; have not offered canning or pickling workshops in many years and they were informal when they were offered (Amy Frye, UBC Farm Director, personal communication, September 18, 2014)	Yes
Simon Fraser University – Vancouver, British Columbia	SFU Local Food Project – Solid Ground Urban Agricultural Skills Training Program[2a,b]	Workshop series designed to educate community members about their food; featured a few workshops about preserving seasonal food in 2011; dehydrating, freezing, and canning	No
BCIT – Vancouver, British Columbia	Food Safety Associate Certificate, Food Technology Diploma[3a,b]	Offers college level academic courses about food processing techniques; content about food preservation on an industrial level	Yes
University of Guelph – Guelph, Ontario	a. Department of Food Science b. Food Processing for Urban Gardeners c. University of Guelph Hospitality Services[4a,b,c]	a. Offers university level food science and processing courses b. Offers an open education course through the Horticulture program about food processing for urban gardeners that teaches how to can, store, dry, and freeze foods c. University of Guelph hospitality food services has a processing facility on campus where they are able to freeze and preserve local and seasonal food for use throughout the year	Yes
Yale University - New Haven, Connecticut	Yale Sustainable Food Program[5a,b,c]	Program to enhance food research and learning through on-campus farms, academic engagement, and community events; held canning workshops in 2010 and 2011	No
Washington State University - throughout Washington state	Washington State University Extension	Offers free or low-cost science-based publications on food preservation[6a]; some extension offices offer online courses[6b,c]; some offices also offer Master Food Preserver Programs[6d]	Yes

Oregon State University - throughout Oregon state	Oregon State University Extension	Offers free or low-cost science-based publications on food preservation[7a]; some extension offices offer short courses[7a]; offers Master Food Preserver Programs[7b]	Yes
University of California - throughout California state	University of California Extension	Offers free or low-cost science-based publications on food preservation[8a]; offers Master Food Preserver Programs[8b]	Yes

1. http://ubcfarm.ubc.ca/community/workshops-short-courses/

2a. http://www.eventbrite.com/o/sfu-local-food-project-1435267030
2b. http://www.eventbrite.com/e/savoring-the-seasons-food-preservation-workshop-tickets-2160173136?aff=eorg

3a. http://www.bcit.ca/study/programs/500adiplt
3b. http://www.bcit.ca/study/programs/6340acert

4a. https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c12/c12food.shtml
4b. http://www.opened.uoguelph.ca/offerings/offering.aspx?id=4317
4c. https://www hospitality.uoguelph.ca/sustainability/downloads/HospitalityInitiatives.pdf

5a. http://sustainablefood.yale.edu/about-us/contact-us
5b. http://calendar.yale.edu/cal/opa/day/20100916/All/CAL-2c9cb3cd-29d2d486-012a-cf082642-000048d6bedework@yale.edu/
5c. http://calendar.yale.edu/cal/gsas/default/today/default/CAL-2c9cb3cd-32a602db-0132-dfb0dfc9-00006dd0bedework@yale.edu/

6a. https://pubs.wsu.edu/ListItems.aspx?CategoryID=180m
6b. http://ext100.wsu.edu/grant-adams/health/food-preservation-safety/
6c. http://ext100.wsu.edu/snohomish/families/food-preservation/
6d. http://ext100.wsu.edu/clark/healthwellness/foodpreservation/masterfoodpreserverprogram/

7a. http://extension.oregonstate.edu/fch/food-preservation
7b. http://extension.oregonstate.edu/lane/announcements/food-preservation-baking-classes

8a. http://ucfoodsafety.ucdavis.edu/UC_Publications/UC_Home_Preservation_and_Storage_Publications/
8b. http://ucfoodsafety.ucdavis.edu/Master_Food_Preserver_Program/

Appendix G – AMS Food Preservation Workshop Series Proposal

Vision

- To provide UBC students, staff, and faculty with the opportunity to learn hands-on food preservation skills and food safety knowledge
- To provide the AMS with a way to extend seasonality and increase local food used in AMS food outlets

Audience

These workshops will be offered to the general UBC community. Workshops will accommodate around 12 students at maximum and would ideally have a variety of community members attend them.

- Primary audience: UBC students
- Secondary audience: UBC faculty and staff

Learning Outcomes

The workshops will teach participants about a variety of subjects and will provide people with tangible skills that they can take home and use to preserve their own food, such as:

- Seasonal and local foods
- Food preservation techniques, mainly for fruits and vegetables
- Sound food safety practices
- Awareness of food system issues surrounding local and seasonal foods

Workshop Types

The series can be made engaging by offering workshops on many different types of preservation, from canning jams or sauces to pickling whole vegetables. They can offer intercultural engagement and food preservation techniques, such as making kimchi or pickled eggs. Eventually, different levels of workshops can be offered, from basic 101 courses that preserve simple fruits or vegetables, to advanced workshops that teach participants how to pickle meat or other meat processing techniques (see Appendix H - workshop levels pyramid). The workshops can also have fun themes, such as "Holiday Gift Canning."

Workshop Facilitators

The workshops will be led by Executive Chef Ryan Bissell or the other AMS chefs.

Workshop Timeline

The pilot workshop will be held in spring of 2015, likely in March. If the pilot is successful, the workshops can be held throughout the summer and early fall (the main growing season). The workshop series might be offered a few times a season at the start, but could expand to a weekly series that run all year long depending on the capacity of the AMS. In addition, if the workshops prove to be successful, they could be expanded to include processing for UBC Food Services, the other major food provider on the UBC-Vancouver campus, in the future. This would contribute to increasing food sustainability at UBC in a longer timeframe.

Communication

The workshops will have to be promoted to the UBC community. Responsibilities could be divided as such:

- AMS Communications: develop design for communication materials (posters, webpage); promote workshops
- AMS Sustainability: help design webpage; coordinate registration; promote workshops
- AMS Food and Beverage: work with partners on communication content and design; promote workshops

The workshops could eventually be filmed and distributed as a series of webinars. There is also the potential that these workshops could be expanded to an off-campus series in the future through Ryan Bissell's chef network.

Outputs

During each workshop, participants will can multiple jars of food. Participants will take home one jar and the other jars will be kept by the AMS to use in their food outlets. Initially, most of the food that is preserved by the AMS and at these workshops will go to The Perch, a fine-dining restaurant that will be located on the roof of the New SUB. Eventually, the project could be scaled up to provide food for many of the AMS food outlets, thus increasing the sustainability of the AMS Food and Beverage on a larger scale.

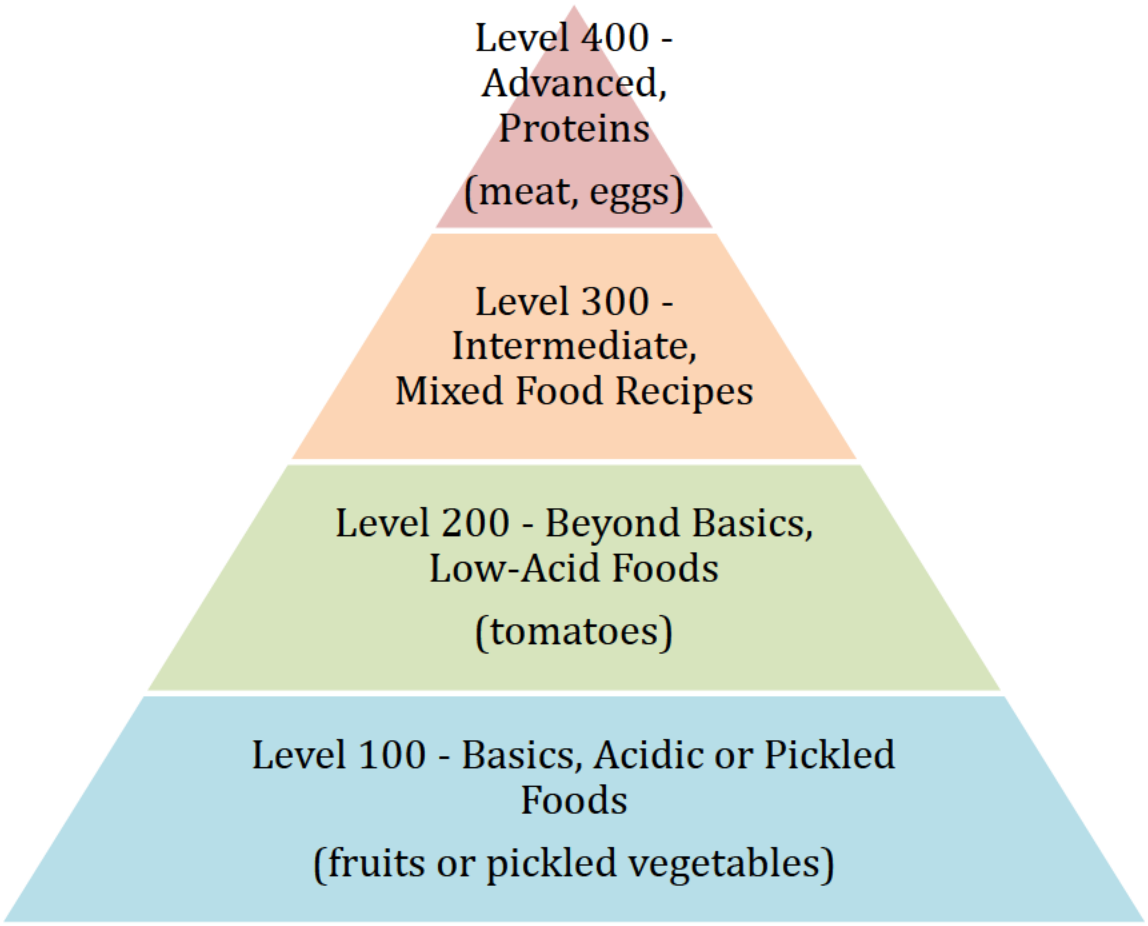
Budget

A budget will be needed to obtain workshop supplies, such jars, labels, printing materials for the participant manuals, and produce. There will be no budget needed for human resources as they will be a part of chefs existing allocated work hours.The goal is for the workshop to have a cost-recovery model whereby workshop participants pay a small fee to cover the costs of the product they take home. The budget for the workshop can possibly be covered by funds from AMS Sustainability, provided an application for funding is submitted.

Logistics

A structure for charging for the workshops as an AMS event will need to be determined, namely which account the money will go to. It is also possible that a waiver would need to be created to cover legal liability. These two aspects can be coordinated with AMS Sustainability.

Appendix H – Levels of Difficulty of Food Preservation



Appendix I – SCRIPT FOR WORKSHOP FACILITATORS

BACKGROUND

Sustainability mandate

- The AMS in acting on policies to increase the sustainability of their operations
- Increasing local and seasonal food used in their food outlets

Sustainability mandate

In 2008, the AMS adopted a document called the Lighter Footprint Strategy. This document guides the AMS towards more environmentally sustainable and just operations. Based on these guiding principles, the AMS Food and Beverage operations aim to be more environmentally sustainable by sourcing and providing as much local and seasonal food as possible in our food retail outlets, as well as providing educational and community events relating to food. These policies are being acted on in the operations; these workshops will also help achieve these sustainability goals by creating an opportunity to engage the UBC community with local food and extend seasonality.

Food Preservation

- Methods of processing and storing fresh foods so that they are safe to eat later
- Many kinds: freezing, dehydrating, canning

Food Preservation

Food preservation involves methods of processing and storing fresh food so that it is safe to eat at a later time. Preserving food keeps food from going bad by eliminating threats, like bacteria, mold, and yeasts that can spoil the food. Another goal of food preservation is to eliminate or inactivate microorganisms that can cause foodborne illness. Food preservation can be done many ways: dehydrating, freezing, canning, and pickling are common ways to preserve food. Currently the AMS freezes food to preserve it but will now use the kitchens in the new Student Union Building and these workshops to preserve food through canning.

Canning

- Method to preserve a diverse array of foods
- Sustainable and safe if done properly

Canning

Canning can be a long and difficult process but it has high rewards. Most products, from fruit to meat, can be canned and a diverse array of products can be made, from salsas to jam to pickled meat. Canning is also a sustainable and safe way to preserve food; once the product has been properly canned, it can be stored at room temperature for up to a year. The AMS would like to expand the amount and type of food they preserve through canning.

Good quality food

- The AMS wants to make 80% of its own food products sold at its food outlets
- Can ensure high quality and good tasting products by purchasing food from local and known farmers

Good quality food

The AMS has a goal of making 80% of its own food products that will be sold in their food outlets. For example, the AMS recently purchased a hamburger patty machine, so now the AMS can make their own hamburgers. By preserving local food that is in season and by purchasing quality products from known farmers, the AMS can ensure that high quality products are sold in their food outlets. This can also lead to improved product taste, as opposed to buying mass produced preserved and pickled products.

Local and seasonal foods

- Food can't be grown all year in Canada, so preserving food is an important way to ensure a source of local food throughout the year
- Preserving local and seasonal produce when it is abundant extends the seasonality of these foods and can increase the environmental sustainability of AMS food outlets

Local and seasonal foods

Canning is also beneficial because it can ensure a source of food throughout the year by preserving fresh and local fruits, vegetables, or other food products when they are in season. Procuring and preserving locally produced food when it is in season and abundant extends the season of these foods by making it possible to eat these local foods throughout the year. We can't grow food all year in many parts of Canada, so food preservation is an important way to ensure we have a supply of food all year long. One of them main benefits of these workshops is that we get to preserve local and seasonal foods for use in the AMS food outlets (and for you [participants] to take home!).

Supporting local farmers

- Preserving food is also a way to support local farmers and the economy
- The multiplier effect: money that is spent in the local economy stays in the community longer

Supporting local farmers

Purchasing local and seasonal food also provides an opportunity to support local farmers and the local economy. Purchasing food from local farmers can help increase the "multiplier effect," which is the idea that money that is spent within a community will stay within the community for a longer amount of time. For example, part of the AMS Food and Beverage sustainability goals is to purchase more food from the UBC Farm. The money that we spend buying produce from the UBC Farm could help pay wages of students who work at the Farm, thus increasing the benefits and circulation of money within our local economy.

Reducing Food Waste and Nutrient Loss

- The AMS can purchase bumper crops, which might otherwise be difficult to sell, from local farmers
- Helps reduce on-farm crop waste and keeps nutrients available for people

Reducing Food Waste and Nutrient Loss

Purchasing large amounts of produce to preserve when it is in season is another way that the AMS can support farmers. Often, farmers can encounter trouble selling their bumper crops at peak season. By purchasing a large volume of produce, the AMS can help farmers earn revenue from these crops and can potentially divert crops from being wasted. Crops that are disposed of on farm can also mean a loss of nutrients. By purchasing and preserving these crops, more nutrients are being saved and consumed by people than if the produce was thrown away.

Regain food skills

- Many people have lost knowledge and skills pertaining to food preservation
- AMS chefs can share their knowledge and help members of the UBC community regain these skills

Regaining food skills

These workshops also provide a way for the UBC community to regain food skills. Over the past few decades, many people have lost knowledge, confidence, and skills related to cooking and food preservation. These workshops provide a platform for skilled chefs to teach the UBC community about canning, which can help spread knowledge about food preservation as well as potentially improve food sustainability by exposing people to local and seasonal foods.

How To Can – Basics of Home Canning

Adapted from the USDA Home Canning Guide[1], the Canadian Government Food Safety website[2], and the University of Minnesota Extension Food Safety website[3]

What is canning?[4]

- Canning is a way to preserve fruits, vegetables, meat, and other food products to keep the food from spoiling
- Canning involves packing raw or cooked food into glass jars with enough liquid to eliminate most air, then processing the jars in hot water or steam
- Processing the jars of food kills harmful microorganisms, as well as spoilage causing microorganisms and enzymes, in the food. In addition, processing creates a seal that prevents microorganisms from entering the jar
- It is important to always follow directions and correct procedures when canning, otherwise the food may be unsafe to consume

Further information:

Processing the jars in high heat (boiling water or steam) kills microorganisms and enzymes that would cause food to spoil or be dangerous to eat, as well as forcing the air from inside the jars. Expelling the air from the jar creates a vacuum seal that prevents bacteria from entering the jar and spoiling the food. Incorrect procedures can lead to canned food that is unsafe to consume; always follow directions or procedures when canning food.

Low-acid versus High-acid Foods[5]

- All foods have a natural level of acidity, which is measured by pH (lower pH=more acidic)
- Foods of different acidities require different methods that must be followed when canning them
- Foods are classified as acidic or low-acid. Foods with a pH of 4.6 or lower are referred to as acid foods, while foods with a pH of 4.6 or higher are low-acid

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[1] United States Department of Agriculture (USDA). (2009). *Complete Guide to Home Canning: Principles of Home Canning*. United States Department of Agriculture. Retrieved from the National Center for Home Preserving site: http://nchfp.uga.edu/publications/usda/GUIDE%201%20Home%20Can.pdf

[2] Government of Canada. (2013). *Home Canning Safety*. Government of Canada. Retrieved from: http://healthycanadians.gc.ca/eating-nutrition/safety-salubrite/food-canning-conserve-aliment-eng.php

[3] Schafer, William. (2014). *Canning Basics 6: Selecting the Correct Processing Time.* University of Minnesota Extension. Retrieved from: http://www.extension.umn.edu/food/food-safety/preserving/canning/canning-basics-6/

[4] (USDA, 2009, p.1-5)

[5] (USDA, 2009, p.1-8)

- Food can be acidified by adding lemon juice, citric acid, or vinegar; it is important to follow recipes when canning foods
- Low-acid foods should be processed in a pressure canner; acid foods can be processed in a boiling water bath

Acid Foods (pH<4.6)	Low-Acid Foods (pH>4.6)
Fruits*	Most fresh vegetables
Pickles	Milk
Sauerkraut	Seafood
Jams/Jellies	Poultry
Fruit Butters	Red meats
Berries	

***Tomatoes and figs:** most varieties are acidic but some can have pH greater than 4.6; the pH should be acidified by adding lemon juice or citric acid

Further Information:

Foods with *low acidity* (pH>4.6) cannot prevent the growth of dangerous microorganisms on their own; they must be made more acidic by adding lemon juice, citric acid, or vinegar and processed at high temperatures. *Acidic* foods (pH<4.6) contain enough acid to block the growth of dangerous microorganisms or destroy them rapidly when heated. The acidity of the food that is being canned will affect the recipe/ingredients used and the processing method.

Boiling-Water versus Steam-Pressure Canners[6]

- Canning can be done one of two ways: a boiling-water bath or steam-pressure canners
- Boiling-Water - placing filled jars on a rack in a big pot and processing the jars in boiling water for a specified period of time that is dependent upon the size of container and the consistency of the product in the container
- Pressure canner - Locks steam inside the canner and builds heat and pressure to process the jars for a specified period of time that is dependent upon the size of container and the consistency of the product in the container
- Pressure canners can reach higher temperatures than boiling-water canners, which makes them safer to use for low-acid foods

[6] (USDA, 2009, p.1-17)

Further Information:

Boiling-Water – a large pot with a rack in it to hold 6-8 jars and water. The pot should be deep enough to accommodate 6.25 cm (2.5 in) of room above the top of the jars when they are placed in the pot (2.5 cm or 1 in for the boiling water above the jars, 2.5 cm or 1 in for the splash of the water, and 1.25cm or 0.5 in for the rack on the bottom). The pot should fit over one burner (it cannot be placed over two burners). The bottom of the pot can be corrugated for gas burners, but must be flat for electric stove elements. The lid of the pot must fit or stay in place when placed above boiling water. The boiling water heats the food in the jars to kill microorganisms and seal the jars. The boiling water method is best for acid foods and is not recommended for canning low-acid foods.

Steam-Pressure Canner – More complicated and expensive than boiling-water canners, but essential for canning low-acid foods. These canners lock and allow steam inside of them to build pressure and reach temperatures of 116°C-121°C (240-250°F). These canners use either a weighted gauge or a dial gauge to measure the pressure (pounds per square inch, PSIG) inside of the canner. Regulating the heat of the burner that the canner is placed on controls the pressure inside the canner. Most low-acid foods need to be canned at 10-15 PSIG, depending on elevation.

Jars, Lids, and Rings[7]

- Use only mason type jars that are meant for canning that are sterilized and in good condition
- Jars can be used more than once
- The two part snap lid and metal twist-on sealing ring create the seal when processed
- Use the snap lids only once; twist-on metal rings can be used until they begin to degrade

Further Information:

Jars – it is important to use jars that are meant for canning, the mason-type jars that are manufactured in the USA or Canada, as these jars are made to withstand processing. Only use jars that are in good condition (i.e. do not have cracks, chips, etc.) and do not use decorative or antique jars. Jars come in many sizes, from 250 ml to half gallon, and are narrow or wide-mouthed. Wide-mouthed are easier to fill and empty. Half-gallon jars should only be used for canning acid juices. Jars may be reused as long as they are in good condition and properly sterilized.

Lids and Rings – the jars are sealed with two piece snap lids made of a metal lid that has sealant around the outer edge and a metal sealing ring. Rings can be reused until they start to degrade; lids can be used only once.

[7] (USDA, 2009, p.1-13)

Sterilization[8]

- Jars, lids, and rings should be properly cleaned and sterilized before use
- Food that will be processed for less than 10 minutes must be sterilized; it is not necessary to sterilize jars that will be processed in a pressure-canner or a boiling-water canner for more than 10 minutes (USDA, 1-15)
- Follow the manufacturer's instructions to clean and/or sterilize lids

Further Information:
Jars, lids, and metal rings can be washed in soapy water and rinsed with clean water. Jars and rings can be washed in the dishwasher.

Sterilize jars in a boiling-water canner. Place jars mouth up on a rack in the pot. Fill with water to 2.5 cm (1 in) above the jars. Boil the jars in the water for 10 minutes or more depending on elevation. Keep the jars in the water until they are ready to be filled, jars should be kept hot until they are ready to be used.

Follow the manufacturer's instructions to sterilize lids. One way to do this can be to pour boiling water over the lids in a bowl, but do not boil the lids or the seal may be ruined. The lids should be hot when they go on the jars.

Hot or Raw/Cold Packing[9]

- Food can be hot or raw/cold packed
- Raw/cold packed - raw or partially cooked vegetables go into jars and are covered with boiling water; good for vegetables being processed in a pressure canner
- Hot packed - filling jars with hot, pre-cooked food; should always be used for food processed in a boiling-water bath
- Hot packing can lead to a higher quality end product

Further Information:

Raw/Cold Packing – placing raw or partially cooked vegetables into prepared and hot jars and covering them with boiling water before being processed. Raw packing is most suitable for vegetables processed in a pressure canner.

Hot Packing – filling hot jars with hot precooked food and adding boiling water before processing. Hot packing should always be used for unsweetened fruit and for food processed in

[8] (USDA, 2009, p.1-14)
[9] (USDA, 2009, p.1-12)

a boiling-water bath. Hot packing can produce better results than raw/cold packing by ensuring a higher quality end product.

Headspace[10]

- Headspace - the amount of space between the food and lid on the jar
- Important for processing to be done properly
- Follow directions on recipe on how much headspace to leave

Further Information:
Headspace is important because air and food expand during processing, which leads to expulsion of air from the container due to formation of water vapor in the headspace during processing. As the jars cool, the water vapor condenses and that leads to the formation of a vacuum that causes the lids to snap as a vacuum seal is formed. The amount of headspace left in the jar depends on what is being canned; recipes for canned goods will have directions on how much headspace to leave.

Food Safety[11]

- Food Safety is extremely important when canning food
- Botulism is an illness that is caused by a toxin produced by a microorganism (*Clostridium botulinum)* that can easily reside in improperly canned foods, which is why it is important to follow correct canning procedures and approved recipes

Further Information:

The safety of home canned products depends on correct processing procedures. It is important to follow all of the directions in an approved recipe, including processing time, size of jar used, and temperatures/pressure during processing, among others.

Botulism
Botulism is the disease caused by the toxin produced by the bacteria *Clostridium botulinum*. Botulism can be fatal to people. The dormant form of *Clostridium botulinum* are spores that are very heat resistant, but those spores can germinate and produce the toxin forming bacteria in improperly canned foods. *Clostridium botulinum* spores can survive for hours at 100°C (212°F), the temperature of boiling water; canned foods (especially low acid foods) should be processed at a temperature of at least 116°C (240°F) for a specified period of time, which is determined by the food composition and the size of the container.

Factors Affecting Processing Procedure[12]

[10] (USDA, 2009, p.1-13)
[11] (USDA, 2009, p.1-6; Government of Canada, 2013)
[12] (Schafer, 2014)

- Correct canning procedures depend on many factors
- Jars must be processed for the correct amount of time at the right temperature and/or pressure to be properly canned and safe to consume
- The size and shape of the jar, the size of the food pieces, fat content, liquid content, pH, raw/cold or hot packing, the type of canner used, and the altitude at which goods are being canned all affect the amount of heat/time needed to properly process the jars
- For example: larger jars with large pieces of food in a boiling-water canner will need more time than a small jar with small pieces of food in a pressure-canner
- It is important to follow the directions on processing time to ensure safe canned goods

Further Information:

During processing the heat in canner (from water or steam) is conducted to the jar of food product, which is how the product is made safe to consume (the heat destroys harmful microorganisms). Heat transfers differently depending on the following factors:

- Jar size and shape - heat transfers through smaller and thinner jars more quickly than taller and wider jars
- Product - the type/fat content of the food product affects the processing requirements; food that is in smaller pieces will heat more quickly than larger pieces; fat insulates food and keeps food from heating up quickly
- Recipe - liquid content (such as fruit syrups and pickle brine) causes food to heat more quickly than more solid food; pre-cooking (hot packing) the food product before processing also causes the food to heat more quickly than raw/cold packing
- Wet steam heats food in jars faster than dry hot air

Time

All of the previous factors affect the amount of time needed to process the jars of food product. It is extremely important to process canned goods for the correct processing time. In general, more time is needed to heat the food products in larger jars and more time is needed to process goods in boiling-water canners. Jars with more solid foods will take longer to reach the required time/temperature combination at the point that heats the slowest in the container. Follow specific directions on approved recipes for the time needed to process specific products, especially for goods that contain a diversity of contents, such as salsas.

Heat and Pressure

When using boiling-water canners, it is important to boil the jars of food for the correct amount of time because harmful microorganisms, such as *Clostridium botulinum*, can survive for long periods of time at the temperature of boiling water. It is important to let the jars cool, undisturbed, at room temperature after being processed, which allows the snap lids to properly form an airtight seal otherwise the goods might spoil.

Steam-pressure canners can be used at temperatures of 116°C to 121°C (240-250°F) and pressures of 5, 10, or 15 PSIG, depending on the product and recipe used. It is important to let the canner cool at room temperature until it is depressurized, which allows the snap lids to properly form an airtight seal, otherwise the goods might spoil.

Altitude
Another important factor in canning is altitude. Water boils at lower temperatures at higher altitudes. It is necessary to adjust processing times and/or pressure when canning at high altitudes. Follow the directions on recipes to adjust for altitude.

Final Notes:

- Canning is a great way to preserve local produce when it is in season
- This can provide people and restaurants with sustainable and local produce all year long
- We encourage everyone to begin this practice, but it is necessary to follow the proper procedures in order to produce canned food that is safe, delicious, and nutritious, so always follow approved and food safe canning recipes!

Procedure
As described in the USDA Home Canning Guide

Home Canning

- Jar rims must be clean for proper vacuum seal to form; uncleaned jar-sealing surfaces may cause seal failures
- Tighten screw bands securely, but if you are especially strong, not as tightly as possible
- Process and cool jars as stated in approved directions and recipes

Boiling-water Canners (USDA, 2009, p.1-18)

1. Before you start preparing your food, fill the canner halfway with clean water. This is approximately the level needed for a canner load of 500 ml (pint jars). For other sizes and numbers of jars, the amount of water in the canner will need to be adjusted so it will be 2.5-5 cm (1 to 2 inches) over the top of the filled jars.

2. Preheat water to 60°C (140°F) for raw-packed foods and to 82°C (180°F) for hot-packed foods. Food preparation can begin while this water is preheating.

3. Fill jars that are hot, and have been cleaned or sterilized, with food and the covering liquid, if using a covering liquid.

4. After filling jars, release air bubbles by inserting a flat plastic (not metal) spatula between the food and the jar. Slowly turn the jar and move the spatula up and down to allow air bubbles to escape. (It is not necessary to release air bubbles when filling jams, jellies or all-liquid foods such as juices.)

5. Adjust the headspace and then clean the jar rim (sealing surface) with a dampened paper towel.

6. Place the preheated lid, gasket down, onto the cleaned jar-sealing surface. Then fit the metal screw band over the flat lid. Follow the manufacturer's guidelines enclosed with or on the box for tightening the jar lids properly.

7. Load filled jars, fitted with lids, into the canner rack and use the handles to lower the rack into the water; or fill the canner with the rack in the bottom, one jar at a time, using a jar lifter. When using a jar lifter, make sure it is securely positioned below the neck of the jar (below the screw band of the lid). Keep the jar upright at all times. Tilting the jar could cause food to spill into the sealing area of the lid.

8. Add more boiling water, if needed, so the water level is at least 2.5 cm (1 inch) above jar tops. For process times over 30 minutes, the water level should be at least 2 inches above the tops of the jars.

9. Turn heat to its highest position, cover the canner with its lid, and heat until the water in the canner boils vigorously.

10. Set a timer for the total minutes required for processing the food.

11. Keep the canner covered and maintain a boil throughout the process schedule. The heat setting may be lowered a little as long as a complete boil is maintained for the entire process time. If the water stops boiling at any time during the process, bring the water back to a vigorous boil and begin the timing of the process over, from the beginning.

12. Add more boiling water, if needed, to keep the water level above the jars.

13. When jars have been boiled for the recommended time, turn off the heat and remove the canner lid. Wait 5 minutes before removing jars.

14. Using a jar lifter, remove the jars and place them on a towel, leaving at least 2.5 cm (1-inch) spaces between the jars during cooling. Let jars sit undisturbed to cool at room temperature for 12 to 24 hours.

Pressure Canners (USDA, 2009, p.1-21)

1. Fill jars that are hot, and have been cleaned or sterilized, with food and the covering liquid, if using a covering liquid.

2. After filling jars, release air bubbles by inserting a flat plastic (not metal) spatula between the food and the jar. Slowly turn the jar and move the spatula up and down to allow air

bubbles to escape. (It is not necessary to release air bubbles when filling jams, jellies or all-liquid foods such as juices.)

3. Adjust the headspace and then clean the jar rim (sealing surface) with a dampened paper towel.

4. Place the preheated lid, gasket down, onto the cleaned jar-sealing surface. Then fit the metal screw band over the flat lid. Follow the manufacturer's guidelines enclosed with or on the box for tightening the jar lids properly.

5. Put 2 to 3 inches of hot water in the canner. Some specific products in this Guide require that you start with even more water in the canner. Always follow the directions with USDA processes for specific foods if they require more water added to the canner.

6. Place filled jars on the rack, using a jar lifter. When using a jar lifter, make sure it is securely positioned below the neck of the jar (below the screw band of the lid). Keep the jar upright at all times. Tilting the jar could cause food to spill into the sealing are of the lid. Fasten canner lid securely.

7. Leave weight off vent port or open petcock. Heat at the highest setting until steam flows freely from the open petcock or vent port. While maintaining the high heat setting, let the steam flow (exhaust) continuously for 10 minutes, and then place the weight on the vent port or close the petcock. The canner will pressurize during the next 3 to 5 minutes.

8. Start timing the process when the pressure reading on the dial gauge indicates that the recommended pressure has been reached, or when the weighted gauge begins to jiggle or rock as the canner manufacturer describes.

9. Regulate heat under the canner to maintain a steady pressure at or slightly above the correct gauge pressure. Quick and large pressure variations during processing may cause unnecessary liquid losses from jars. Follow the canner manufacturer's directions for how a weighted gauge should indicate it is maintaining the desired pressure.

   IMPORTANT: If at any time pressure goes below the recommended amount, bring the canner back to pressure and begin the timing of the process over, from the beginning (using the total original process time). This is important for the safety of the food.

10. When the timed process is completed, turn off the heat, remove the canner from heat if possible, and let the canner depressurize. Do not force-cool the canner. Forced cooling may result in unsafe food or food spoilage. Cooling the canner with cold running water or opening the vent port before the canner is fully depressurized will cause loss of liquid from jars and seal failures. Force-cooling may also warp the canner lid of older model canners, causing steam leaks. Depressurization of older models without dial gauges should be timed. Standard-size heavy-walled canners require about 30 minutes when

loaded with pints and 45 minutes with quarts. Newer thin-walled canners cool more rapidly and are equipped with vent locks. These canners are depressurized when their vent lock piston drops to a normal position.

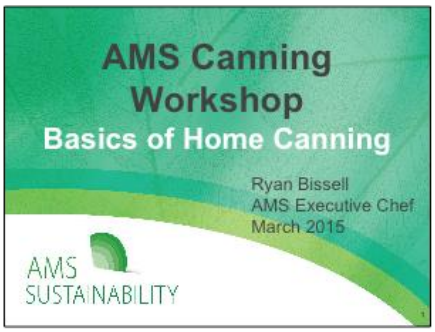
11. After the canner is depressurized, remove the weight from the vent port or open the petcock. Wait 10 minutes, unfasten the lid, and remove it carefully. Lift the lid away from you so that the steam does not burn your face.

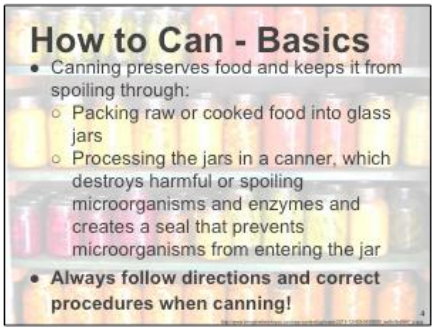
12. Remove jars with a jar lifter, and place them on a towel, leaving at least 1-inch spaces between the jars during cooling. Let jars sit undisturbed to cool at room temperature for 12 to 24 hours.

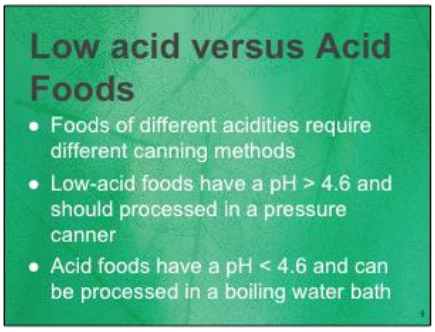
High Volume Canning

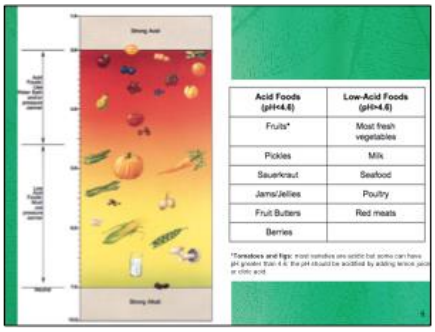
- The workshop will teach a method of home canning but the AMS would use different methods to preserve food for its operations
- High volume canning that the AMS will do will take place in industrial steamers, where the process will mimic home pressure-canners
- Sterilization at the AMS will be different than home canning; jars and metal rings will be sterilized in an industrial dishwasher and the oven and snap lids will be placed in hot water

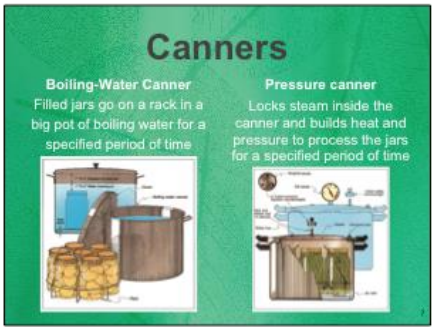
APPENDIX J – POWERPOINT PRESENTATION FOR WORKSHOP FACILITATORS











Sterilization

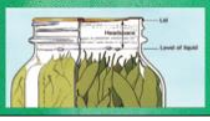
- Jars, lids, and rings should be properly cleaned and sterilized before use
- Follow manufacturer's instructions to clean and/or sterilize lids

Hot or Raw/Cold Packing

- Raw/cold packed - raw or partially cooked vegetables go into jars and are covered with boiling water
- Hot packed - filling jars with hot, pre-cooked food

Headspace

- Headspace - the amount of space between the food and lid on the jar
- Important for processing to be done properly; follow directions on how much headspace to leave



Headspace

- Water vapor forms in the headspace during the processing, which forces air from the jar
- When the jars cool, the water vapor condenses and forms a vacuum
- This causes the lid to snap onto the jar and creates the air-tight seal

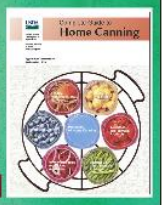
Food Safety

- Botulism - can be caused by a microorganism that can reside in improperly canned foods
- Important to follow correct canning procedures and approved recipes
- Main factors that affect food safety: time, temperature, type and pH of food, and jar shape/size

Final Notes

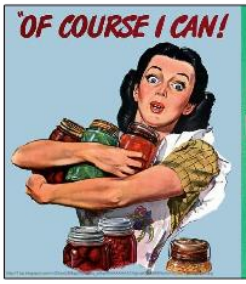
- Canning is a great way to preserve local produce when it is in season
- This can provide people and restaurants with sustainable and local produce all year long
- Remember, it is necessary to follow the proper procedures so that canned food that is safe, delicious, and nutritious
- Always follow approved and food safe canning recipes!

Information in the presentation and manual can be found from these sources

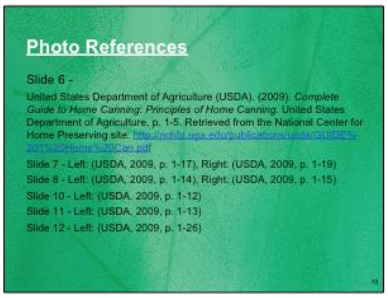


Government of Canada

University of Minnesota | Extension



Thanks! Now into the kitchen!



APPENDIX K – CANNING MANUAL FOR WORKSHOP PARTICIPANTS

BACKGROUND

Notes

Sustainability mandate

In 2008, the AMS adopted a document called the Lighter Footprint Strategy. This document guides the AMS towards more environmentally sustainable and just operations. Based on these guiding principles, the AMS Food and Beverage operations aim to be more environmentally sustainable by sourcing and providing as much local and seasonal food as possible in our food retail outlets, as well as providing educational and community events relating to food. These policies are being acted on in the operations; these workshops will also help achieve these sustainability goals by creating an opportunity to engage the UBC community with local food and extend seasonality.

Food Preservation

Food preservation involves methods of processing and storing fresh food so that it is safe to eat at a later time. Preserving food keeps food from going bad by eliminating threats, like bacteria, mold, or yeast that can spoil the food. Another goal of food preservation is to eliminate or inactivate microorganisms that can cause foodbourne illness. Food preservation can be done many ways: dehydrating, freezing, canning, and pickling are common ways to preserve food. Currently the AMS freezes food to preserve it but will now use the kitchens in the new Student Union Building and these workshops to preserve food through canning.

Canning

Canning can be a long and difficult process but it has high rewards. Most food products, from fruit to meat, can be canned and a diverse array of products can be made, from salsas to jam to pickled meat. Canning is also a sustainable and safe way to preserve food; once the product has been properly canned, it can be stored at room temperature for up to a year. The AMS would like to expand the amount and type of food they preserve through canning.

Good quality food

The AMS has a goal of making 80% of its own food products that will be sold in their food outlets. For example, the AMS recently purchased a hamburger patty machine, so now the AMS can make their own hamburgers. By preserving local food that is in season and by purchasing quality products from known farmers, the AMS can ensure that high quality products are sold in their food outlets. This can also lead to improved product taste, as opposed to buying mass produced preserved and pickled products.

Local and seasonal foods

Canning is also beneficial because it can ensure a source of food throughout the year by preserving fresh and local fruits, vegetables, or other food products when they are in season. Procuring and preserving locally produced food when it is in season and abundant extends the season of these foods by making it possible to eat these local foods throughout the year. We can't grow food all year in many parts of Canada, so food preservation is an important way to ensure we have a supply of food all year long. One of them main benefits of these workshops is that we get to preserve local and seasonal foods for use in the AMS food outlets (and for you [participants] to take home!).

Supporting local farmers

Purchasing local and seasonal food also provides an opportunity to support local farmers and the local economy. Purchasing food from local farmers can help increase the "multiplier effect," which is the idea that money that is spent within a community will stay within the community for a longer amount of time. For example, part of the AMS Food and Beverage sustainability goals is to purchase more food from the UBC Farm. The money that we spend buying produce from the UBC Farm could help pay wages of students who work at the Farm, thus increasing the benefits and circulation of money within our local economy.

Reducing Food Waste and Nutrient Loss

Purchasing large amounts of produce to preserve when it is in season is another way that the AMS can support farmers. Often, farmers can encounter trouble selling their bumper crops at peak season. By purchasing a large volume of produce, the AMS can help farmers earn revenue from these crops and can potentially divert crops from being wasted. Crops that are disposed of on farm can also mean a loss of nutrients. By purchasing and preserving these crops, more nutrients are being saved and consumed by people than if the produce was thrown away.

Regain food skills

These workshops also provide a way for the UBC community to regain food skills. Over the past few decades, many people have lost knowledge, confidence, and skills related to cooking and food preservation. These workshops provide a platform for skilled chefs to teach the UBC community about canning, which can help spread knowledge about food preservation as well

as potentially improve food sustainability by exposing people to local and seasonal foods.

How To Can – Basics of Home Canning

Adapted from the USDA Home Canning Guide[1], the Canadian Government Food Safety website[2], and the University of Minnesota Extension Food Safety website[3]

What is canning?[4]

- Canning is a way to preserve fruits, vegetables, meat, and other food products to keep the food from spoiling
- Canning involves packing raw or cooked food into glass jars with enough liquid to eliminate most air, then processing the jars in hot water or steam
- Processing the jars of food kills harmful microorganisms, as well as spoilage causing microorganisms and enzymes, in the food. In addition, processing creates a seal that prevents microorganisms from entering the jar
- It is important to always follow directions and correct procedures when canning, otherwise the food may be unsafe to consume

Further information:

Processing the jars in high heat (boiling water or steam) kills microorganisms and enzymes that would cause food to spoil or be dangerous to eat, as well as forcing the air from inside the jars. Expelling the air from the jar creates a vacuum seal that prevents bacteria from

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[1] United States Department of Agriculture (USDA). (2009). *Complete Guide to Home Canning: Principles of Home Canning*. United States Department of Agriculture. Retrieved from the National Center for Home Preserving site: http://nchfp.uga.edu/publications/usda/GUIDE%201%20Home%20Can.pdf

[2] Government of Canada. (2013). *Home Canning Safety*. Government of Canada. Retrieved from: http://healthycanadians.gc.ca/eating-nutrition/safety-salubrite/food-canning-conserve-aliment-eng.php

[3] Schafer, W. (2014). *Canning Basics 6: Selecting the Correct Processing Time.* University of Minnesota Extension. Retrieved from: http://www.extension.umn.edu/food/food-safety/preserving/canning/canning-basics-6/

[4] (USDA, 2009, p.1-5)

entering the jar and spoiling the food. Incorrect procedures can lead to canned food that is unsafe to consume; always follow directions or procedures when canning food.

Low-acid versus High-acid Foods[5]

- All foods have a natural level of acidity, which is measured by pH (lower pH=more acidic)
- Foods of different acidities require different methods that must be followed when canning them
- Foods are classified as acidic or low-acid. Foods with a pH of 4.6 or lower are referred to as acid foods, while foods with a pH of 4.6 or higher are low-acid
- Food can be acidified by adding lemon juice, citric acid, or vinegar; it is important to follow recipes when canning foods
- Low-acid foods should be processed in a pressure canner; acid foods can be processed in a boiling water bath

Acid Foods (pH<4.6)	**Low-Acid Foods (pH>4.6)**
Fruits*	Most fresh vegetables
Pickles	Milk
Sauerkraut	Seafood
Jams/Jellies	Poultry
Fruit Butters	Red meats
Berries	

***Tomatoes and figs:** most varieties are acidic but some can have pH greater than 4.6; the pH should be acidified by adding lemon juice or citric acid

Further Information:

Foods with *low acidity* (pH>4.6) cannot prevent the growth of dangerous microorganisms on their own; they must be made more acidic by adding lemon juice, citric acid, or vinegar and processed at high temperatures. *Acidic* foods (pH<4.6) contain enough acid to block the

[5] (USDA, 2009, p.1-8)

growth of dangerous microorganisms or destroy them rapidly when heated. The acidity of the food that is being canned will affect the recipe/ingredients used and the processing method.

Boiling-Water versus Steam-Pressure Canners[6]

- Canning can be done one of two ways: a boiling-water bath or steam-pressure canners
- Boiling-Water - placing filled jars on a rack in a big pot and processing the jars in boiling water for a specified period of time that is dependent upon the size of container and the consistency of the product in the container
- Pressure canner - Locks steam inside the canner and builds heat and pressure to process the jars for a specified period of time that is dependent upon the size of container and the consistency of the product in the container
- Pressure canners can reach higher temperatures than boiling-water canners, which makes them safer to use for low-acid foods

Further Information:

Boiling-Water – a large pot with a rack in it to hold 6-8 jars and water. The pot should be deep enough to accommodate 6.25 cm (2.5 in) of room above the top of the jars when they are placed in the pot (2.5 cm or 1 in for the boiling water above the jars, 2.5 cm or 1 in for the splash of the water, and 1.25cm or 0.5 in for the rack on the bottom). The pot should fit over one burner (it cannot be placed over two burners). The bottom of the pot can be corrugated for gas burners, but must be flat for electric stove elements. The lid of the pot must fit or stay in place when placed above boiling water. The boiling water heats the food in the jars to kill microorganisms and seal the jars. The boiling-water method is best for acid foods and is not recommended for canning low-acid foods.

Steam-Pressure Canner – More complicated and expensive than boiling-water canners, but essential for canning low-acid foods. These canners lock and allow steam inside of them to build pressure and reach temperatures of 116°C-121°C (240-250°F). These canners use either a weighted gauge or a dial gauge to measure the pressure (pounds per square inch, PSIG) inside of the canner. Regulating the heat of the burner that the canner is placed on controls the pressure inside the canner. Most low-acid foods need to be canned at 10-15 PSIG, depending on elevation.

[6] (USDA, 2009, p.1-17)

Jars, Lids, and Rings[7]

- Use only mason type jars that are meant for canning that are sterilized and in good condition
- Jars can be used more than once
- The two part snap lid and metal twist-on sealing ring create the seal when processed
- Use the snap lids only once; twist-on metal rings can be used until they begin to degrade

Further Information:

Jars – it is important to use jars that are meant for canning, the mason-type jars that are manufactured in the USA or Canada, as these jars are made to withstand processing. Only use jars that are in good condition (i.e. do not have cracks, chips, etc.) and do not use decorative or antique jars. Jars come in many sizes, from 250 ml to half gallon, and are narrow or wide-mouthed. Wide-mouthed are easier to fill and empty. Half-gallon jars should only be used for canning acid juices. Jars may be reused as long as they are in good condition and properly sterilized.

Lids and Rings – the jars are sealed with two piece snap lids made of a metal lid that has sealant around the outer edge and a metal sealing ring. Rings can be reused until they start to degrade; lids can be used only once.

Sterilization[8]

- Jars, lids, and rings should be properly cleaned and sterilized before use
- Food that will be processed for less than 10 minutes must be sterilized; it is not necessary to sterilize jars that will be processed in a pressure-canner or a boiling-water canner for more than 10 minutes (USDA, 1-15)
- Follow the manufacturer's instructions to clean and/or sterilize lids

Further Information:

[7] (USDA, 2009, p.1-13)
[8] (USDA, 2009, p.1-14)

Jars, lids, and metal rings can be washed in soapy water and rinsed with clean water. Jars and rings can be washed in the dishwasher.

Sterilize jars in a boiling-water canner. Place jars mouth up on a rack in the pot. Fill with water to 2.5 cm (1 in) above the jars. Boil the jars in the water for 10 minutes or more depending on elevation. Keep the jars in the water until they are ready to be filled, jars should be kept hot until they are read to be used.

Follow the manufacturers instructions to sterilize lids. One way to do this can be to pour boiling water over the lids in a bowl, but do not boil the lids or the seal may be ruined. The lids should be hot when they go on the jars.

Hot or Raw/Cold Packing[9]

- Food can be hot or raw/cold packed
- Raw/cold packed - raw or partially cooked vegetables go into jars and are covered with boiling water; good for vegetables being processed in a pressure canner
- Hot packed - filling jars with hot, pre-cooked food; should always be used for food processed in a boiling-water bath
- Hot packing can lead to a higher quality end product

Further Information:

Raw/Cold Packing – placing raw or partially cooked vegetables into prepared and hot jars and covering them with boiling water before being processed. Raw packing is most suitable for vegetables processed in a pressure canner.

Hot Packing – filling hot jars with hot precooked food and adding boiling water before processing. Hot packing should always be used for unsweetened fruit and for food processed in a boiling-water bath. Hot packing can produce better results than raw/cold packing by ensuring a higher quality end product.

Headspace[10]

[9] (USDA, 2009, p.1-12)
[10] (USDA, 2009, p.1-13)

- Headspace - the amount of space between the food and lid on the jar
- Important for processing to be done properly
- Follow directions on recipe on how much headspace to leave

Further Information:
Headspace is important because air and food expand during processing, which leads to expulsion of air from the container due to formation of water vapor in the headspace during processing. As the jars cool, the water vapor condenses and that leads to the formation of a vacuum that causes the lids to snap as a vacuum seal is formed. The amount of headspace left in the jar depends on what is being canned; recipes for canned goods will have directions on how much headspace to leave.

Food Safety[11]

- Food safety is extremely important when canning food
- Botulism is an illness that is caused by a toxin produced by a microorganism *(Clostridium botulinum)* that can easily reside in improperly canned foods, which is why it is important to follow correct canning procedures and approved recipes

Further Information:

The safety of home canned products depends on correct processing procedures. It is important to follow all of the directions in an approved recipe, including processing time, size of jar used, and temperatures/pressure during processing, among others.

Botulism
Botulism is the disease caused by the toxin produced by the bacteria *Clostridium botulinum*. Botulism can be fatal to people. The dormant form of *Clostridium botulinum* are spores that are very heat resistant, but those spores can germinate and produce the toxin forming bacteria in improperly canned foods. *Clostridium botulinum* spores can survive for hours at 100°C (212°F), the temperature of boiling water; canned foods (especially low acid foods) should be processed at a temperature of at least 116°C (240°F) for a specified period of time, which is determined by the food composition and the size of the container.

[11] (USDA, 2009, p.1-6; Government of Canada, 2013)

Factors Affecting Processing Procedure[12]

- Correct canning procedures depend on many factors
- Jars must be processed for the correct amount of time at the right temperature and/or pressure to be properly canned and safe to consume
- The size and shape of the jar, the size of the food pieces, fat content, liquid content, pH, raw/cold or hot packing, the type of canner used, and the altitude at which goods are being canned all affect the amount of heat/time needed to properly process the jars
- For example: larger jars with large pieces of food in a boiling-water canner will need more time than a small jar with small pieces of food in a pressure-canner
- It is important to follow the directions on processing time to ensure safe canned goods

Further Information:

During processing the heat in canner (from water or steam) is conducted to the jar of food product, which is how the product is made safe to consume (the heat destroys harmful microorganisms). Heat transfers differently depending on the following factors:

- Jar size and shape - heat transfers through smaller and thinner jars more quickly than taller and wider jars
- Product - the type/fat content of the food product affects the processing requirements; food that is in smaller pieces will heat more quickly than larger pieces; fat insulates food and keeps food from heating up quickly
- Recipe - liquid content (such as fruit syrups and pickle brine) causes food to heat more quickly than more solid food; pre-cooking (hot packing) the food product before processing also causes the food to heat more quickly than raw/cold packing
- Wet steam heats food in jars faster than dry hot air

Time

All of the previous factors affect the amount of time needed to process the jars of food product. It is extremely important to process canned goods for the correct processing time. In general, more time is needed to heat the food products in larger jars and more time is needed to process goods in boiling-water canners. Jars with more solid foods will take longer to reach

[12] (Schafer, 2014)

the required time/temperature combination at the point that heats the slowest in the container. Follow specific directions on approved recipes for the time needed to process specific products, especially for goods that contain a diversity of contents, such as salsas.

Heat and Pressure
When using boiling-water canners, it is important to boil the jars of food for the correct amount of time because harmful microorganisms, such as *Clostridium botulinum*, can survive for long periods of time at the temperature of boiling water. It is important to let the jars cool, undisturbed, at room temperature after being processed, which allows the snap lids to properly form an airtight seal otherwise the goods might spoil.

Steam-pressure canners can be used at temperatures of 116°C to 121°C (240-250°F) and pressures of 5, 10, or 15 PSIG, depending on the product and recipe used. It is important to let the canner cool at room temperature, undisturbed, until it is depressurized, which allows the snap lids to properly form an airtight seal otherwise the goods might spoil.

Altitude
Another important factor in canning is altitude. Water boils at lower temperatures at higher altitudes. It is necessary to adjust processing times and/or pressure when canning at high altitudes. Follow the directions on recipes to adjust for altitude.

Final Notes:
Canning is a great way to preserve local produce when it is in season**,** which can provide people and restaurants with sustainable and local produce all year long. We encourage everyone to begin this practice, but it is necessary to follow the proper procedures in order to produce canned food that is safe, delicious, and nutritious, so always follow approved and food safe canning recipes!

<u>Procedure</u>
As described in the USDA Home Canning Guide

Home Canning
- Jar rims must be clean for proper vacuum seal to form; uncleaned jar-sealing surfaces may cause seal failures
- Tighten screw bands securely, but if you are especially strong, not as tightly as possible
- Process and cool jars as stated in approved directions and recipes

Boiling-water Canners (USDA, 2009, p.1-18)

1. Before you start preparing your food, fill the canner halfway with clean water. This is approximately the level needed for a canner load of 500 ml (pint jars). For other sizes and numbers of jars, the amount of water in the canner will need to be adjusted so it will be 2.5-5 cm (1 to 2 inches) over the top of the filled jars.

2. Preheat water to 60°C (140°F) for raw-packed foods and to 82°C (180°F) for hot-packed foods. Food preparation can begin while this water is preheating.

3. Fill jars that are hot, and have been cleaned or sterilized, with food and the covering liquid, if using a covering liquid.

4. After filling jars, release air bubbles by inserting a flat plastic (not metal) spatula between the food and the jar. Slowly turn the jar and move the spatula up and down to allow air bubbles to escape. (It is not necessary to release air bubbles when filling jams, jellies or all-liquid foods such as juices.)

5. Adjust the headspace and then clean the jar rim (sealing surface) with a dampened paper towel.

6. Place the preheated lid, gasket down, onto the cleaned jar-sealing surface. Then fit the metal screw band over the flat lid. Follow the manufacturer's guidelines enclosed with or on the box for tightening the jar lids properly.

7. Load filled jars, fitted with lids, into the canner rack and use the handles to lower the rack into the water; or fill the canner with the rack in the bottom, one jar at a time, using a jar lifter. When using a jar lifter, make sure it is securely positioned below the neck of the jar (below the screw band of the lid). Keep the jar upright at all times. Tilting the jar could cause food to spill into the sealing area of the lid.

8. Add more boiling water, if needed, so the water level is at least 2.5 cm (1 inch) above jar tops. For process times over 30 minutes, the water level should be at least 2 inches above the tops of the jars.

9. Turn heat to its highest position, cover the canner with its lid, and heat until the water in the canner boils vigorously.

10. Set a timer for the total minutes required for processing the food.

11. Keep the canner covered and maintain a boil throughout the process schedule. The heat setting may be lowered a little as long as a complete boil is maintained for the entire process time. If the water stops boiling at any time during the process, bring the water back to a vigorous boil and begin the timing of the process over, from the beginning.

12. Add more boiling water, if needed, to keep the water level above the jars.

13. When jars have been boiled for the recommended time, turn off the heat and remove the canner lid. Wait 5 minutes before removing jars.

14. Using a jar lifter, remove the jars and place them on a towel, leaving at least 2.5 cm (1-inch) spaces between the jars during cooling. Let jars sit undisturbed to cool at room temperature for 12 to 24 hours.

Pressure Canners (USDA, 2009, p.1-21)

1. Fill jars that are hot, and have been cleaned or sterilized, with food and the covering liquid, if using a covering liquid.

2. After filling jars, release air bubbles by inserting a flat plastic (not metal) spatula between the food and the jar. Slowly turn the jar and move the spatula up and down to allow air bubbles to escape. (It is not necessary to release air bubbles when filling jams, jellies or all-liquid foods such as juices.)

3. Adjust the headspace and then clean the jar rim (sealing surface) with a dampened paper towel.

4. Place the preheated lid, gasket down, onto the cleaned jar-sealing surface. Then fit the metal screw band over the flat lid. Follow the manufacturer's guidelines enclosed with or on the box for tightening the jar lids properly.

5. Put 2 to 3 inches of hot water in the canner. Some specific products in this Guide require that you start with even more water in the canner. Always follow the directions with USDA processes for specific foods if they require more water added to the canner.

6. Place filled jars on the rack, using a jar lifter. When using a jar lifter, make sure it is securely positioned below the neck of the jar (below the screw band of the lid). Keep the jar upright at all times. Tilting the jar could cause food to spill into the sealing are of the lid. Fasten canner lid securely.

7. Leave weight off vent port or open petcock. Heat at the highest setting until steam flows freely from the open petcock or vent port. While maintaining the high heat setting, let the steam flow (exhaust) continuously for 10 minutes, and then place the weight on the vent port or close the petcock. The canner will pressurize during the next 3 to 5 minutes.

8. Start timing the process when the pressure reading on the dial gauge indicates that the recommended pressure has been reached, or when the weighted gauge begins to jiggle or rock as the canner manufacturer describes.

9. Regulate heat under the canner to maintain a steady pressure at or slightly above the correct gauge pressure. Quick and large pressure variations during processing may cause unnecessary liquid losses from jars. Follow the canner manufacturer's directions for how a weighted gauge should indicate it is maintaining the desired pressure.

   IMPORTANT: If at any time pressure goes below the recommended amount, bring the canner back to pressure and begin the timing of the process over, from the beginning (using the total original process time). This is important for the safety of the food.

10. When the timed process is completed, turn off the heat, remove the canner from heat if possible, and let the canner depressurize. Do not force-cool the canner. Forced cooling may result in unsafe food or food spoilage. Cooling the canner with cold running water or opening the vent port before the canner is fully depressurized will cause loss of liquid from jars and seal failures. Force-cooling may also warp the canner lid of older model canners, causing steam leaks. Depressurization of older models without dial gauges should be timed. Standard-size heavy-walled canners require about 30 minutes when loaded with pints and 45 minutes with quarts. Newer thin-walled canners cool more rapidly and are

equipped with vent locks. These canners are depressurized when their vent lock piston drops to a normal position.

11. After the canner is depressurized, remove the weight from the vent port or open the petcock. Wait 10 minutes, unfasten the lid, and remove it carefully. Lift the lid away from you so that the steam does not burn your face.

12. Remove jars with a jar lifter, and place them on a towel, leaving at least 1-inch spaces between the jars during cooling. Let jars sit undisturbed to cool at room temperature for 12 to 24 hours.

APPENDIX L – ADAPTED PICKLED CARROTS RECIPE

Pickled Carrots
Adapted from Ryan Bissell's recipe and the USDA Home Canning Guide recipe[1]

Carrots
- Fresh, Local Carrots - 10 lbs
- Fresh Pickling Dill - 56.7 grams (approximately 11.33 teaspoons)
- Pasteurized Garlic - 45.35 grams (approximately 9 teaspoons)
- Chili Flakes - 1.13 grams (approximately 1/4 teaspoon)

Brine
- 4.5 kilograms/liters water
- 1.8 kilograms/liters pickling vinegar (7% acetic acid)
- 226.8 grams salt

Procedure:
1. Wash and peel carrots.
2. Cut into rounds that are approximately 1/2 inch thick.
3. Combine brine ingredients in a pot; water, vinegar, and salt. Bring to a rapid boil and hold boil for 3 minutes.
4. Add carrots to brine and bring back to a boil.
5. Reduce to a simmer and heat carrots till they are half cooked, about 10 minutes.
6. Place seasonings in cleaned and sterilized empty jars.
7. Fill jars with hot carrots, leaving 1-inch headspace.
8. Fill with hot pickling liquid, leaving 1/2-inch headspace.
9. Remove air bubbles and adjust headspace if needed.
10. Wipe rims of jars with a dampened clean paper towel.
11. Place snap lid on jar. Twist screw band to finger-tip tight only (over tightening of the screw band can cause seal failure).
12. Place filled jars in rack in boiling water canner. Ensure jars are submerged by a minimum of 2.5 cm of boiling water. Place lid on canner.

[1] United States Department of Agriculture (USDA). (2009). *Complete Guide to Home Canning: Preparing and Canning Fermented Foods and Pickled Vegetables*. United States Department of Agriculture; p.6-16. Retrieved from the National Center for Home Preserving site: http://nchfp.uga.edu/publications/usda/GUIDE%206%20Home%20Can.pdf

13. Bring water back to boil. Then process carrots in jars for 12-14 minutes.
14. Remove jars from canner. Place on cooling rack.
15. Test for seal. If seal has not occurred within 10 minutes of removal from canner, remove lid, apply another snap lid and screw band, and reprocess, or discard product.