Reducing Household Food Waste

Audrey Bichelmeir, Peter Chen, Blake Fuller, Sarah Hirano, An Ngo

Abstract

Food waste is a huge problem around the world, mainly household food wastes as they are one of the largest contributors. Our project was to turned used cooking oil that is common in every household into hand soak that can be used for everyday purposed. In the second semester of our project, we turned the bar soap into liquid soap and tested how effective it was against bacteria. This is significant as it is something that everyone can do and is a cheap way to help reduce food waste. Especially in the time of the pandemic, washing our hands will limit the spread of COVID-19.

Introduction

What is food waste?

Food waste refers to the decrease in the quantity or quality of food resulting from decisions and actions by retailers, food service providers and consumers.

1960–2017 Data on Food in MSW by Weight (in thousands of U.S. tons)

Management Pathway	1960	1970	1980	1990	2000	2005	2010	2015	2016	2017
Generation	12,200	12,800	13,000	23,860	30,700	32,930	35,740	39,730	40,310	40,670
Recycled	-	-	-	-	-	-	-	-	-	-
Composted	-	-	-	-	680	690	970	2,100	2,150	2,570
Combustion with Energy Recovery	-	50	260	4,060	5,820	5,870	6,150	7,380	7,480	7,470
Landfilled	12,200	12,750	12,740	19,800	24,200	26,370	28,620	30,250	30,680	30,630

How?

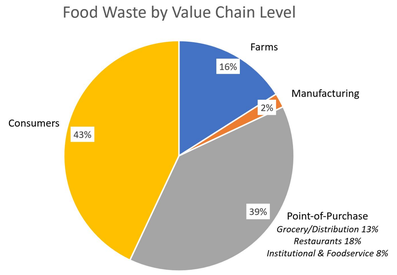
- Removed from the supply chain during sorting operations
- Foods that are close to, at or beyond the “best-before” date are often discarded by retailers and consumers.
- Large quantities of wholesome edible food are often unused or left over and discarded from household kitchens and eating establishments such as schools and restaurants.

Household?

- One of the largest contributor
- Food are thrown out instead of saved as leftovers
- Food have been spilled,
- Food are thrown away after their expiration dates them.

How?

- Buy in bulk and can’t finish on time
- Stores them and forgets
- Live alone so too much food
- Children are picky eaters, don’t eat everything
- Make serepate meals for elderly people who can’t eat same food as family



This pie chart shows the distribution of food waste by chain level.

Methods

Solid bar

Items:

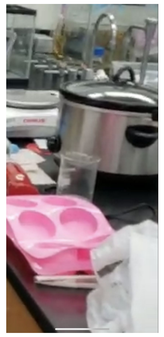
- Lye (67.755 G)
- Oil (443 ML)
- Water (133 ML)

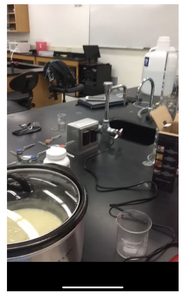
Method

1. Heat up oil
2. Mix lye with water
3. Put lye solution to oil
4. Wait 50 min
5. Let sit 12-24 hours

Liquefaction (Optional)

1. 4 ounces bar
2. Shred soap via soap grater/peeler
3. Heat soap pieces in a pot with 8/9 cups water
4. Add 1 tablespoon of vegetable glycerin (optional)
5. Remove from heat and let sit for 12-24 hrs.
6. Allow to thicken overnight and whisk
7. If too thick, repeat the process until achieve desired outcome
8. Add scent/essential oil (optional)
9. Transfer to a container





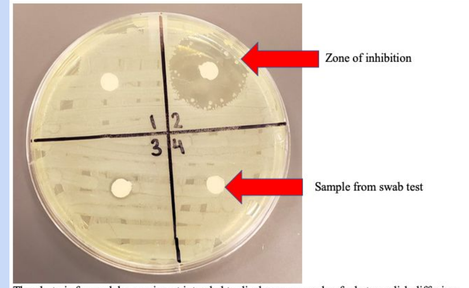
Results

Our soap

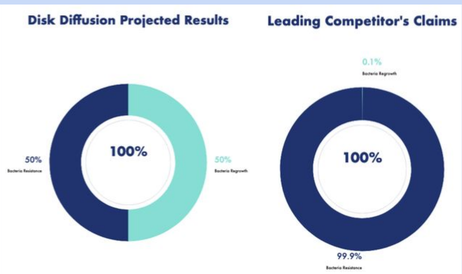
We created bars of soap per the methods described above. Unfortunately, we were unable to test prior to the university closure, so we conducted research to mock up the following projections.

Projections

Seen 50%+ effective bacteria-killing properties
Disk diffusion post-incubation demonstrates a zone of inhibition with radius 3 mm
Our soap displays 50% efficacy



The photo is from a lab experiment intended to display an example of what our disk diffusion would have looked like. The zone of inhibition measures the area surrounding the sample where bacteria does not regrow. The larger, the less susceptible the sample is to regrow bacteria.



The above charts visually represent the projected data. We projected our soap to display a 50% efficacy rate, while leading competitors SoftSoap and Dove claim 99.9% efficacy rate.

Conclusion

Why a solution to food waste is important

- The pie chart above demonstrates that most food is discarded on the consumer/household level
  - Meaning that solving food waste at this level would most beneficial as less food could be wasted
- The information displayed in the above table illustrates that more food is being wasted with each generation
  - Food waste is becoming a bigger and bigger problem

What we learned

- Edible quality food is often discarded in sorting, stores, and at home.
- Creating soap from used cooking oil, lye, and water was one way to decrease this waste of food, by offering a second life to cooking oil.
  - The soap was projected to kill more than 50% of bacteria.

Future Work

- Partner up with a company, and find a way to supply the soap to an audience

Bibliography

“7 hand soaps to fight germs, from cheap to luxury.“ cnet.com. , May 1, 2020 2020. Web.

Food Waste Is a Massive Problem-Here's Why. FoodPrint. [accessed 2020 Apr 29].

How to make liquid soap from leftover bar soap. Clark Howard. 2017 Aug 10.Sandle, Tim. 2015. Antiobiotics and preservatives . Pharmaceutical Microbiology 14(2):171-183.

Schanes, Karin & Dobernig, Karin & Gözet, Burcu. (2018). Food waste matters - A systematic review of household food waste practices and their policy implications. Journal of Cleaner Production.

Werf PVD, Seabrook JA, Gilliland JA. The quantity of food waste in the garbage stream of southern Ontario, Canada households. 2018;13(6)
Winger J. Homemade Hot Process Soap Recipe in a Crock Pot. 2015 May 15.

Acknowledgements

We would like to acknowledge the GCI department at Chapman University for funding our experiment. We also thank Professor Silva for giving us the idea and supporting us through our work the first semester and Professor Gormally for supporting us through our last semester of the project.